LESSON PLAN

FOR

AN/WSC-6A(V)9 MAINTENANCE

A-101-0145

PREPARED BY

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CHANGE RECORD

Number and Description of Change(s)	Entered By	Date

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SECURITY AWARENESS NOTICE

This course does not contain any classified material.

SAFETY/HAZARD AWARENESS NOTICE

All personnel involved in operation or maintenance of electronic equipment must be thoroughly familiar with the electronic equipment safety precautions contained in Electronic Installation and Maintenance Book, General, NAVSEA SE000-00-EIM-100, Section 3, and Naval Ships' Technical Manual, Chapter 300, S9086-KC-STM-010/CH-300, Section 2. In addition, attention is directed to the Navy Safety Program Instructions, OPNAVINST 5100.19 (series) and 5100.23 (series), and the safety training requirements contained in CNETINST 1500.20 (series).

This equipment employs voltages, which are dangerous and may be fatal if contacted by operating or maintenance personnel. There are mechanical safety devices associated with this equipment that must be maintained in a constant state of readiness to preclude causing injury to personnel and/or damage to equipment. Extreme caution must be exercised when working with or handling this equipment. Some components are extremely heavy. Rigid pre-inspections must be made to handling equipment to ensure their safety and safety summaries must be read to the handling teams prior to conducting dangerous evolutions. Hazard awareness dictates that this equipment must always be viewed as an integral part of a system and not as a component. While every practical precaution has been incorporated into this equipment, it is not possible or practical to try to list every condition or hazard that you may encounter. Therefore, all operating or maintenance personnel must at all times observe as a minimum, the following:

DON'T SERVICE OR ADJUST ALONE

Under no circumstances will a person operate or maintain equipment without the immediate presence or assistance of another person capable of rendering aid. Unless under direct supervision of a qualified person, no person shall operate or maintain equipment for which he is unqualified.

DON'T TAMPER WITH INTERLOCKS

Reliance on interlock circuits to remove power from the equipment is never to be assumed. Until operation of the interlock is verified, equipment is assumed to be in the hazardous mode of operation. Under no circumstances will any access gate, door, or interlock switch be

SAFETY/HAZARD AWARENESS NOTICE (CONT.)

removed, bypassed, or modified in any way by other than authorized maintenance personnel and then only after observing proper tag-out procedures.

REPORT ALL HAZARDS

If at any time you detect a hazard, it is your responsibility to report the hazard to ensure that it is corrected. If at any time you detect a "new" or "suspected new" hazard, particularly due to equipment installation, modification, or repair, it is your responsibility to ensure that a SAFETYGRAM is submitted to the Naval Safety Center, Norfolk, VA, in accordance with OPNAVINST 5102.1 (series). This will ensure that this hazard will be investigated, publicized, or corrected, as required.

Additionally, SSPINST 3100.1 (series) requires SWS personnel to submit special check TFRs when a potential or actual unsafe condition is noticed that could cause injury to personnel and/or damage to equipment. When a problem/failure occurs involving the safety of personnel or equipment and it cannot be immediately resolved by command/technical assistance on-site, the TFR data shall be transmitted to SSP and others by Naval Message.

SAFETY - "TRAINING TIME OUT"

In any training situation when a student or instructor expresses concern for personal safety, it is an indication that a need for clarification of procedures or requirements exists and a "Training Time Out" shall be called. An individual should verbally call "TRAINING TIME OUT" (TTO) if they detect a hazardous condition during any teaching session (lab or theory), or raise a clenched fist to indicate a "TRAINING TIME OUT" (TTO) if the verbal command cannot be heard. Training activities will be suspended until the hazardous situation has been examined and additional explanation and instruction has been provided to allow safe resumption of training. Caution should be used to ensure a halt to a procedure does not result in additional hazards. TTO follow-up procedures will be performed in accordance with CNET Instruction 1500.20(Series).

SAFETY/HAZARD AWARENESS NOTICE (CONT.)

PRE-MISHAP PLAN

The Pre-Mishap plan explains the procedures to follow and essential telephone numbers to call in case of an accident or emergency. It is located by the emergency exit in the laboratory.

TERMINAL OBJECTIVES

1.0 **DESCRIBE** THE PURPOSE, FUNCTION, AND CHARACTERISTICS OF THE SUPER HIGH FREQUENCY (SHF) SATELLITE COMMUNICATION SYSTEMS in accordance with applicable technical manuals (CTTL item # 1)

2.0 **OPERATE** THE SHF BASEBAND EQUIPMENT in accordance with applicable technical manuals (CTTL item # 9)

3.0 **OPERATE** THE SHF RF EQUIPMENT in accordance with applicable technical manuals (CTTL item # 24)

4.0 **MAINTAIN** the SHF Baseband Equipment in accordance with applicable technical manuals (CTTL item # 48)

5.0 **MAINTAIN** THE SHF RF EQUIPMENT in accordance with applicable technical manuals (CTTL item # 62)

LESSON PLAN

Unit 1. INTRODUCTION TO SUPER HIGH FREQUENCY (SHF) SATELLITE COMMUNICATION SYSTEMS **A-101-0145**

Topic 1.1 Introduction to Super High Frequency (SHF) Satellite Communication System

CLASS PERIODS: 3
LAB PERIODS: 0
PA PERIODS: 0

Enabling Objectives:

1.1 **MATCH** specified terms and abbreviations to a list of terms in accordance with applicable technical manuals

1.2 **DESCRIBE** the purpose, function, and characteristics of a SHF network in accordance with applicable technical manuals

1.3 **DESCRIBE** the purpose, function, and characteristics of the Space segment of a SHF system in accordance with applicable technical manuals

1.4 **DESCRIBE** the purpose, function, and characteristics of the SHF earth terminals in accordance with applicable technical manuals

1.5 **DESCRIBE** the purpose, function, and characteristics of the SHF BASEBAND equipment in accordance with applicable technical manuals

1.6 **DESCRIBE** the purpose, function, and characteristics of the SHF Shipboard terminals in accordance with applicable technical manuals

1.7 **LOCATE** all major AN/WSC-6A(V)9 components in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. US Navy Super High Frequency Satelite Communications Description, FSCS-400-83-00-2 US Navy SHF Satcom Description

Topic 1.1 Introduction to Super High Frequency (SHF) Satellite Communication System

C. Training Materials Required:

1. Instruction Sheets
   a. Introduction to Super High Frequency (SHF) Satellite Communication System, Outline Sheet 1–1–1
   b. Terms and Abbreviations, Information Sheet 1–1–2

LESSON PLAN

Unit 1. INTRODUCTION TO SUPER HIGH FREQUENCY (SHF) SATELLITE COMMUNICATION SYSTEMS **A-101-0145**

Topic 1.1 Introduction to Super High Frequency (SHF) Satellite Communication System

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction NOTE: Explain Classroom/Lab Safety, TTO's, Cut-Out Switches, trainees can look at equipment, but DO NOT touch	1. Establish Contact. Refer trainee to Outline Sheet 1-1-1, Introduction to Super High Frequency (SHF) Satellite Communication System.
2. MATCH specified terms and abbreviations to a list of terms in accordance with applicable technical manuals	2. Refer to and direct trainee to refer to US Navy Super High Frequency Satelite Communications Description, FSCS-400-83-00-2 US Navy SHF Satcom Description, Volume 1. Refer trainee to Information Sheet 1-1-2, Terms and Abbreviations.
3. DESCRIBE the purpose, function, and characteristics of a SHF network in accordance with applicable technical manuals	

LESSON PLAN

Unit 1. INTRODUCTION TO SUPER HIGH FREQUENCY (SHF) SATELLITE COMMUNICATION SYSTEMS **A-101-0145**

Topic 1.1 Introduction to Super High Frequency (SHF) Satellite Communication System

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
a. Requirements for SHF and what drives the required bandwidth	
b. History, Current and projected SHF configurations	
4. DESCRIBE the purpose, function, and characteristics of the Space segment of a SHF system in accordance with applicable technical manuals	
a. DSCS Organization	
b. Satellite Configuration and Characteristics	
5. DESCRIBE the purpose, function, and characteristics of the SHF earth terminals in accordance with applicable technical manuals	

Topic 1.1 Introduction to Super High Frequency (SHF) Satellite Communication System

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
a. AN/FSC-78B	
b. AN/GSC-39	
c. AN/GSC-52	
d. Ground Mobile Terminals	
6. DESCRIBE the purpose, function, and characteristics of the SHF BASEBAND equipment in accordance with applicable technical manuals	
a. AN/WSC-6A(V)5	
b. AN/WSC-6A(V)7	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. AN/WSC-6A(V)9	
d. AN/WSC-8(V)2	
e. SUBHDR	
7. DESCRIBE the purpose, function, and characteristics of the SHF Shipboard terminals in accordance with applicable technical manuals	
a. Multiplexers	
(1) AN/FCC-100(V)X	
(2) TIMEPLEX Link system	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
b. Modems	
(1) SLM-3650	
(2) VLM-3650	
(3) MD-1030B	
(4) CQM-248A	
c. Cryptographic equipment	
(1) KG-194A (KIV-19)	
(2) KG-84A (KIV-7)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) STU-III	
(4) STE (Secure Terminal Equipment)	
(5) KY-68	
8. LOCATE all major AN/WSC-6A(V)9 components in accordance with applicable technical manuals	8. Show course specific equipment in lab.
9. Safety	
10. Review and Summary	

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

CLASS PERIODS: 3
LAB PERIODS: 3
PA PERIODS: 0

Enabling Objectives:

2.1 **STATE** the purpose of the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

2.2 **DESCRIBE** the operational characteristics of the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

2.3 **OPERATE** the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. SB-4124 MULTIPURPOSE PATCH PANEL, 0913-LP-160-9800/EE167-JA-OMI-010

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the Ancillary equipment required for the AN/WSC-6A(V)X, Outline Sheet 2–1–1
   b. Signal Standard Pin-outs, Information Sheet 2–1–2
   c. Intro to Serial Communications, Information Sheet 2–1–3
   d. BERT standard configuration, Information Sheet 2–1–4
   e. BERT Standard Configuration, Setup & Operation, Job Sheet 2–1–5
   f. Operation of the Ancillary equipment required for the AN/WSC-6A(V)X, Assignment Sheet 2–1–6

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

g. Operation of the Ancillary Equipment, Job Sheet 2–1–7

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 2-1-1, Operation of the Ancillary equipment required for the AN/WSC-6A(V)X.
2. STATE the purpose of the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	
a. 115 VAC	
b. COS (Code Operated Switch)	b. Discuss how the COS interfaces the OIU with TimePlex, AN/FCC-100(V)X, & SLM-3650, status and control Interfaces, via the terminal emulator or Procomm Plus.
c. Patch Panel	
(1) Loopbacks	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
d. Break-Out Panel	
e. Oscilloscope	
f. Bit Error Rate Tester (BERT)	
(1) Multi-function communications analyzer	
3. DESCRIBE the operational characteristics of the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	
a. COS (Code Operated Switch)	a. Refer to COS manual.
(1) Ports (6)	
(2) Patching (RJ-45 serial)	

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
b. Patch Panel	b. Discuss the "Normal Through" configuration, and how patching affects circuit connections.
(1) Equipment Jack	(1) Direct trainee to SB-4124 MULTIPURPOSE PATCH PANEL, 0913-LP-160-9800/EE167-JA-OMI-010.
(2) Line Jack	
(3) Monitor	
(4) Loopbacks (DL/Equip/Line)	
(5) DTE/DCE Relationship	(5) DCE passes timing to DTE.
c. Break-Out Panel	

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Switch and Test Point Relationships	
(2) Signal Standards	(2) Direct trainee to Information Sheet 2-1-2, Signal Standard Pin-outs. Direct trainee to Information Sheet 2-1-3, Intro to Serial Communications.
(a) RS(EIA)-530 (Balanced and Unbalanced)	
(b) MIL-188-C (Balanced and Unbalanced)	
(c) RS(EIA)-449 (Balanced and Unbalanced)	
(3) Data signaling	
(a) Analog/Digital	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY

(b) ASYNC/SYNC

(c) Analog to Digital (Pulse Code Modulation (PCM))

(d) DATA Formats

1) NRZ

2) AMI (Bipolar AMI)

3) T-CDI/CDI

4) B8ZS

d. Oscilloscope

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
e. Bit Error Rate Tester(BERT)	
(1) Terminates and analyzes digital communications circuits	
(2) Features and charcteristics change based on modules inserted and interface selected	
4. OPERATE the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	
a. COS (Code Operated Switch)	a. Refer trainee to COS manual.
(1) Commands	
(2) Patching (RJ-45 serial)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Normal/Degraded	
b. Oscilloscope	
(1) Selecting channel to be controlled	
(a) Set-up of volts per division	
(b) Set-up of time per division	
c. Bit Error Rate Tester (BERT)	c. Refer trainee to Information Sheet 2-1-4, BERT standard configuration. Refer to Job Sheet 2-1-5, BERT Standard Configuration, Setup & Operation.
5. Safety	

Topic 2.1 Operation of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
6. Review and Summary	
7. Assignment	7. Direct trainee to Assignment Sheet 2-1-6, Operation of the Ancillary equipment required for the AN/WSC-6A(V)X.
8. Operate the Ancillary equipment	8. Refer trainee to Job Sheet 2-1-7, Operation of the Ancillary Equipment.

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.2 Operation of the AN/FCC-100(V)9 Time Division Multiplexer

CLASS PERIODS: 2
LAB PERIODS: 3
PA PERIODS: 0

Enabling Objectives:

2.4 **STATE** the purpose of the AN/FCC-100(V)9 in accordance with applicable technical manuals

2.5 **DESCRIBE** the operational characteristics of the AN/FCC-100(V)9 in accordance with applicable technical manuals

2.6 **OPERATE** the AN/FCC-100(V)9 in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. User Manual, AN/FCC-100(V)9 Time Division Multiplexer, -

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the AN/FCC-100(V)9 Time Division Multiplexer, Outline Sheet 2–2–1
   b. Operation of the AN/FCC-100(V)9 Time Division Multiplexer, Assignment Sheet 2–2–2
   c. Operation of AN/FCC-100(V)9, Job Sheet 2–2–3

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.2 Operation of the AN/FCC-100(V)9 Time Division Multiplexer

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 2-2-1, Operation of the AN/FCC-100(V)9 Time Division Multiplexer.
2. STATE the purpose of the AN/FCC-100(V)9 in accordance with applicable technical manuals	2. Refer trainee to User Manual, AN/FCC-100(V)9 Time Division Multiplexer, -.
a. 16-channel Time Division Multiplexer	
3. DESCRIBE the operational characteristics of the AN/FCC(V)9 in accordance with applicable technical manuals	
a. Aggregate Characteristics	
b. Port Characteristics	

Topic 2.2 Operation of the AN/FCC-100(V)9 Time Division Multiplexer

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. OPERATE the AN/FCC-100(V)9 in accordance with applicable technical manuals	
a. Controls and Indicators	
b. Module Placement	
c. Command Architecture	
(1) Configure (Five Main Portions)	
(a) Clock and Communication Modes	(a) Discuss and explain the relationship between the Technical Manual and Menu selections. Terminology differs.
(b) Bandwidth (Date Rate)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(c) Aggregate	
(d) Port Configurations	
(e) CAU (Crypto Ancillary Unit)	
(2) Activate	
(3) Examine	
(4) Status	
(5) Loopback	
(a) Port and Aggregate	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY

(b) Local and Remote

(c) Bi-Directional

(6) Test

d. Operation using COS

(1) Control Terminal Configuration

(2) COS Commands

5. Bandwidth Calculations

6. Review and Summary

Topic 2.2 Operation of the AN/FCC-100(V)9 Time Division Multiplexer

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7. Assignment	7. Direct trainee to Assignment Sheet 2-2-2, Operation of the AN/FCC-100(V)9 Time Division Multiplexer.
8. Operate the AN/FCC-100(V)9	8. Direct trainee to Job Sheet 2-2-3, Operation of AN/FCC-100(V)9.

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.3 Operation of the TIMEPLEX LINK system

CLASS PERIODS: 8
LAB PERIODS: 14
PA PERIODS: 0

Enabling Objectives:

2.7 **STATE** the purpose of the TIMEPLEX LINK system in accordance with applicable technical manuals

2.8 **DESCRIBE** the operational characteristics of the TIMEPLEX LINK system in accordance with applicable technical manuals

2.9 **OPERATE** the TIMEPLEX LINK system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813
2. TIMEPLEX Group LINK 2+ Users Guide, MC15811

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the TIMEPLEX LINK system, Outline Sheet 2–3–1
   b. Basic TIMEPLEX Link system commands, Information Sheet 2–3–2
   c. Operation of the TIMEPLEX LINK system, Assignment Sheet 2–3–3
   d. TIMEPLEX Link system, Job Sheet 2–3–4

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 2-3-1, Operation of the TIMEPLEX LINK system.
2. STATE the purpose of the TIMEPLEX LINK system in accordance with applicable technical manuals	
a. Provides high capacity, wide area network for voice, data, and image communications	
3. Describe the Technical Documentation	3. Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811.
4. DESCRIBE the operational Characteristics of the TIMEPLEX LINK system in accordance with applicable technical manuals	
a. Smart Multiplexer	a. Define.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
b. Uses a Unix style operating system	
c. Network accepts up to 2000 nodes	
d. Supports up to 12 Intermachine links with a total combined throughput of 12 Mbps	
e. Interfaces with various equipment types, to include:	
(1) TimePlex Link/2+, Minilink, Link 100, ST-1000, Channelized telephone carrier services (& Phone switches), AN/FCC-100, Other multiplexers, ADNS, VIS, & TSS	
f. Major Components	
(1) Main Frame (Nest)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) 6 slot MicroLink	
(b) 13 slot MiniLink	
(c) 18 slot Link/2+	
(2) Power Supplies	
(a) Correct Indications - MiniLink / Link/2+	
(b) +5 & +/-12VDC (Link/2+ has second p/s that supports load sharing)	
(c) -48 VDC	
(d) Controls and Indicators	

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Card Types	(3) Refer to Installation and Maintenance manual.
NOTE: Inform students about identifying card versions	
(a) Network Module (NCL)	(a) Refer to Installation and Maintenance manual chapter 23.
1) Primary Microprocessor Control	
2) Must be installed in Slot 1 with a redundant module in slot 2	
3) Provides Clocks (phase lock looped). Must have same type PLL module on each NCL	
4) Internal oscillator in Stratum 3 with optional daughter board	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
5) Detects and reports alarm conditions within the Timeplex Link system	
6) Stores system database	
7) Controls supervisory communications between nodes	
8) Initializes & supervises interaction between all modules in Timeplex(Nest)	
9) Supports up to 2.048 Mbps per interface card	
10) Controls and Indicators	10) Discuss purpose, function, and states of controls and indicators.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
11) Conform to RS-232 on supervisory port	11) Discuss what the supervisory port is used for. (Operator Interface).
12) Strapping discussed in Maintenance topic	
(b) Intermachine Link Module (ILC)	(b) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, chapter 15.
1) Performs Multiplexing/Demultiplexing and framing functions	1) Framing is a TimePlex Proprietary technique for ILC.
2) Maintains link synchronization (Intermachine Link)	

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3) Intermachine link's speeds from 4.8 Kbps to 2.048 Mbps	
4) A redundant pair ILC's must be installed in adjacent slots with the primary module in the lower numbered ODD slot	
5) ILC must be located in the Control Nest of multi Nest system	
6) Optional Satellite buffer daughter board	6) All buffering is performed in the modem.
7) Conforms to RS-422	7) Explain RS-422 is standard used for electrical levels, but connector pin-outs are TimePlex proprietary.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
8) Controls and Indicators	8) Discuss purpose, function, and states of controls and indicators.
9) Strapping discussed in Maintenance topic	
(c) Quad Synchronous Module (QSC)	(c) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, chapter 30.
1) Data rates up to 256 Kbps	1) Discuss that the 4 channels combined speed is limited to 256 Kbps or less. Channel speed is jumper selectable. Max speed of 64 Kbps per channel when all 4 are used.
2) Conforms to RS-422	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3) Controls and Indicators	3) Discuss purpose, function, and states of controls and indicators.
4) Strapping discussed in Maintenance topic	
(d) Quad Synchronous Processor (QSP)	(d) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 31.
1) Data rates of 50 bps to 1.984 Mbps	1) Discuss the fact that the 4 channels combined speed is limited to 1.984Mbps or less.
2) Conforms to RS-422	
3) Controls and Indicators	3) Discuss purpose, function, and states of controls and indicators.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4) Strapping discussed in Maintenance topic	
(e) Foreign Exchange Office/Station (FXO/FXS) and Network Termination Module	(e) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 36.
1) FXS connects to a telephone/phone switch on ship	
2) FXO connects to shore phone company	2) Example: Connect phone on ship to FXS ch 1 thru Timeplex to Shore SATCOM facility thru either a Timeplex link/2+, Link 100, or ST-1000, thru FXO ch1 out to local phone company analog line.
3) FXOs talk to FXSs of the same version and vice versa	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4) FXS to FXS for Auto Ringdown	
5) Controls and Indicators	5) Discuss purpose, function, and states of controls and indicators.
6) Strapping discussed in Maintenance topic	
(f) Digital Voice Processor (ILP)	(f) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 17.
1) Transfers up to 24 DS0s via time slot interchange between the TIMEPLEX Link system and a DS-1 channel	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
2) DS0 channels can be processed by a Voice Server Module (VSM.5) for voice compression. (12 max)	
3) A redundant pair of ILPs must be installed in adjacent slots with the primary module in the lower numbered ODD slot	
4) Conforms to RS-422	
5) Controls and Indicators	
6) Strapping discussed in Maintenance topic.	
(g) Voice Server Module (VSM)	(g) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 37.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1) 12 channels of Voice Compression	
2) VSM.5 can be used for secure STU-III connections and CLEP	
3) Controls and Indicators	
(h) Bipolar Interface Module (BIM)	(h) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 18.
1) Converts unipolar NRZ signals from the Voice Processor to AMI bipolar format	
2) Used with ILP.4 and ILP.6 Voice processors	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3) Conforms to DSX-1 line standard	
4) Controls and Indicators	
5) Strapping discussed in Maintenance topic	
(i) Control mainframe driver Module (DRC)	(i) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 12.
(j) Expander mainframe driver Module (DRE)	(j) Refer trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, Chapter 13.
(k) Data Termination Unit Module (DTU)	

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
5. OPERATE the TIMEPLEX Link system in accordance with TIMEPLEX Group LINK 2+ technical manuals	
a. Operation of Terminal Emulator Program on OIU	a. Discuss setup and configuration of Procom Plus.
b. Commands	b. Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811.
(1) Command structure	(1) Describe how commands are structured and how suffixes affect command response.
(2) Support Commands	(2) Direct trainee to Information Sheet 2-3-2, Basic TIMEPLEX Link system commands. Refer to Users manual Chapter 4.
(a) SET MUM LOC/REM	(a) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 4-11.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) SET PG	(b) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 4-12.
(c) Control A,B,D,F and R	(c) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 4-2 & 4-3.
(d) NOD XX "(STATEMENT)	(d) Emphasize that the use of a quotation mark at end of statement is not required. Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 4-13.
(e) NOD XX (COMMAND)	(e) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 3-1 (Nnot a support command but similiar).

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Configuration Commands	(3) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, chapter 6.
(a) INS nn:ss	(a) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-96.
(b) RMV nn:ss	(b) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-96.
(c) DEF DL #	(c) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-68.
(d) DEF RTE #	(d) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-85.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(e) CLR RTE #	(e) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-85.
(f) DEF CFB #	(f) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-57.
(g) DEF CH/XXX nn:ss:cc (XXX is card type)	(g) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-59.
(h) DEL CH nn:ss:cc	(h) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-93.
(i) NOD XX "(STATEMENT)	(i) Emphasize that the use of a quotation mark at end of statement is not required.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(j) DEF DST CH nn:ss:cc/N# Cnn:ss:cc	(j) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-70.
(k) DEF CON nn:ss:cc/N# Cnn:ss:cc	(k) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-66.
(l) CON CH nn:ss:cc	(l) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-46.
(m) DSC CH nn:ss:cc	(m) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-46.
(n) SET VSM nn:ss	(n) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-115.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(o) DEF DS1 nn:ss	(o) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-72.
(p) DEF VPR #	(p) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-90.
(q) CLR VPR #	(q) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-90.
(r) DEF DS0 nn:ss:cc	(r) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-72.
(s) CON DS0 nn:ss:cc	(s) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-46.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(t) DSC DS0 nn:ss:cc	(t) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-46.
(u) CON DR	(u) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-48.
(4) Display Commands	(4) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, chapter 5.
(a) DSP SY	(a) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-102.
(b) DSP ST SY	(b) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-95.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(c) DSP ST DL #	(c) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-81.
(d) DSP CON *	(d) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-26.
(e) DSP TOP	(e) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-105.
(f) DSP ST CH nn:ss:cc	(f) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-75.
(g) DSP CH nn:ss:cc	(g) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-17.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(h) DSP DL#	(h) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-29.
(i) DSP DS0 nn:ss:cc	(i) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-30.
(j) DSP DS1 nn:ss	(j) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-31.
(k) DSP AQ	(k) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-12.
(l) CLR AQ	(l) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-12.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(5) Diagnostic Commands	(5) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, Chapter 7.
(a) RST nn:ss	(a) Refer trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-63.
(b) LP LB DL #	(b) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-23.
(c) CLR DL #	(c) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-23.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(d) LP LB CH nn:ss:cc	(d) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-12.
(e) CLR CH nn:ss:cc	(e) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-12.
(f) LP LB VS nn:ss:cc	(f) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-40.
(g) CLR CH nn:ss:cc	(g) Give basic description and emphasize more detail to be discussed in maintenance topic. User manual page 7-12.

Topic 2.3 Operation of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
6. Safety	
7. Review and Summary	
8. Assignment	8. Direct trainee to Assignment Sheet 2-3-3, Operation of the TIMEPLEX LINK system.
9. OPERATE the TIMEPLEX LINK system	9. Direct trainee to perform Job Sheet 2-3-4, TIMEPLEX Link system.

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.4 Operation of the Cryptographic devices

CLASS PERIODS: 2
LAB PERIODS: 3
PA PERIODS: 0

Enabling Objectives:

2.13 **STATE** the security requirements for the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals

2.10 **STATE** the purpose of the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals

2.11 **DESCRIBE** the operational Characteristics of the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals

2.12 **OPERATE** the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Limited Maintenance Manual for TSEC/KG-194/194A, KAM-529A/TSEC RP
2. Limited Maintenance Manual LMM-5A for TSEC/KG-84, 84A, EE187-BB-MMO-010/TSEC/KG-84,84A
3. Operators Manual Digital Subscriber Voice Terminal KY-68, TM11-5810-329-10
4. STE Office/Tactical (Secure Terminal equipment), OSTE-UM-1B Rev: 2
5. STU III User's Manual, STU III User's Manual

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the Cryptographic devices required for the AN/WSC-6A(V)X, Outline Sheet 2–4–1
   b. Cryptographic Devices, Information Sheet 2–4–2
   c. Operation of the Cryptographic devices required for the AN/WSC-6A(V)X, Assignment Sheet 2–4–3
   d. Operation of the TSEC/KG-194A, Job Sheet 2–4–4
   e. Operation of the TSEC/KG-84A, Job Sheet 2–4–5
   f. Operation of the KY-68, Job Sheet 2–4–6

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer to Outline Sheet 2-4-1, Operation of the Cryptographic devices required for the AN/WSC-6A(V)X.
2. STATE the security requirements for the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals	
3. STATE the purpose of the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals	
a. KG-194A (KIV-19)	a. Discuss Limited Maintenance Manual for TSEC/KG-194/194A, KAM-529A/TSEC RP.
(1) Trunk encryption/decryption in full duplex synchronous operation	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
b. KG-84A	b. Discuss Limited Maintenance Manual LMM-5A for TSEC/KG-84, 84A, EE187-BB-MMO-010/TSEC/KG-84,84A.
(1) General purpose encryption/decryption of digital data on dedicated links	
c. STU-III	c. Discuss STU III User's Manual, STU III User's Manual.
(1) Voice and data encryption	
d. STE (Secure Terminal Equipment)	d. Discuss STE Office/Tactical (Secure Terminal equipment), OSTE-UM-1B Rev: 2.
(1) Voice and data encryption	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
e. KY-68	e. Discuss Operators Manual Digital Subscriber Voice Terminal KY-68, TM11-5810-329-10.
(1) Secure voice communications	
f. Fill Devices	f. Used to store or transfer Cryptographic keying material.
(1) KOI-18 (Transfer)	
(2) KYK-13 (Store and Transfer)	
(3) AN/CYZ-10 (Store and Transfer)	
4. DESCRIBE the operational Characteristics of the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
a. KG-194A (KIV-19)	
(1) 9.6Kbps to 13Mbps	
(2) 19-54 VDC (28 VDC Nominal)	
(3) Designed for trunks or high data rate circuits	
b. KG-84A	
(1) SYNC or ASYNC	
(2) 50bps to 64Kbps (32Kbps max using internal clocking)	
(3) Multipe configuration possibilities	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. STU-III	
(1) Requires KSD-64 (CIK)	
(2) Version dependent	
(3) 2.4Kbps - 9.6Kbps	
d. STE	
e. KY-68	
(1) 16Kbps or 32Kbps (CDI)	
f. Fill Devices	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) KOI-18	
(a) Tape Reader	
(2) KYK-13	
(a) 6-Position storage	
(3) AN/CYZ-10	
(a) Microprocessor-based transfer and storage device	
5. OPERATE the Cryptographic devices required for the AN/WSC-6A(V)x in accordance with applicable technical manuals	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
a. KG-194A (KIV-19)	
(1) Controls and Indicators	
NOTE: "PWR ON" indicator will not be lit unless primary power and battery voltage is correct	
(2) Key Loading Procedures	
(3) Key Change Operation	
(4) Key Update Operation	
b. KG-84A	
(1) Controls and Indicators	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) Key Loading Procedures	
c. STU-III	
(1) Controls and Indicators	
d. STE	
(1) Controls and Indicators	
e. KY-68	
(1) Controls and Indicators	
(2) Key Loading Procedures	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
f. Fill Devices	
(1) KOI-18	
(a) Controls and Indicators	
(b) Key Loading Procedures	
(2) KYK-13	
(a) Controls and Indicators	
(b) Key Loading Procedures	
(3) AN/CYZ-10	

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Controls and Indicators	
(b) Key Loading Procedures	
6. Safety	
7. Review and Summary	
8. Assignment	8. Refer trainee to Information Sheet 2-4-2, Cryptographic Devices. Direct trainee to Assignment Sheet 2-4-3, Operation of the Cryptographic devices required for the AN/WSC-6A(V)X.
9. Operate the Cryptographic Equipment	9. Direct trainee to Job Sheet 2-4-4, Operation of the TSEC/KG-194A.

Topic 2.4 Operation of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
	Direct trainee to Job Sheet 2-4-5, Operation of the TSEC/KG-84A. Direct trainee to Job Sheet 2-4-6, Operation of the KY-68.

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.5 Operation of the Baseband equipment as a system

CLASS PERIODS: 2
LAB PERIODS: 9
PA PERIODS: 0

Enabling Objectives:

2.14 **OPERATE** the baseband equipment as a system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of Baseband as a system, Outline Sheet 2–5–1
   b. Operation of Baseband as a system, Assignment Sheet 2–5–2
   c. Operation of the Baseband Equipment as a System, Job Sheet 2–5–3

LESSON PLAN

Unit 2. OPERATION OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 2.5 Operation of the Baseband equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact.
2. OPERATE the baseband equipment as a system in accordance with applicable technical manuals	2. Direct trainee to Outline Sheet 2-5-1, Operation of Baseband as a system.
a. Interoperability	a. Introduce how the course will progress by using all of the associated Baseband together as a system. Emphasize how units fit together and how faults will be seen when other units are faulty.
3. Safety	
a. Personnel	
(1) Multiple Power Sources	
(2) Moving Antenna	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) TTO	
b. Equipment	
(1) IRP Cable	
(2) ESD	
4. Review and Summary	
5. Operate the Baseband	5. Direct trainee to Assignment Sheet 2-5-2, Operation of Baseband as a system.
6. Job Sheet	6. Direct trainee to perform Job Sheet 2-5-3, Operation of the Baseband Equipment as a System.
7. Knowledge Test	7. Administer Knowledge Test 1K.

Topic 2.5 Operation of the Baseband equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
8. Performance Test	8. Administer Performance Test 1P.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.1 Operation of the OIU

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

3.1 **STATE** the purpose of the OIU in accordance with applicable technical manuals

3.2 **DESCRIBE** the operational characteristics of the OIU in accordance with applicable technical manuals

3.3 **OPERATE** the OIU in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the OIU, Outline Sheet 3–1–1
   b. Operation of the OIU, Assignment Sheet 3–1–2
   c. Operation of the OIU, Job Sheet 3–1–3

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.1 Operation of the OIU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-1-1, Operation of the OIU.
2. STATE the purpose of the OIU	2. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, pg. 1-36.
a. Provides operator with a Graphical User Interface for control of AN/WSC-6(V)9	
3. DESCRIBE the operational characteristics of the OIU	
a. Standard Personal computer (PC) loaded with a windows operating system and AN/WSC-6A(V)9 system specific software	
b. Interfaces via a series of windows selectable pull down menus and "Hot buttons"	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. Interfaces with system through an ethernet hub to the Modem Processor Assembly's (MPA) Input-Output Manager (IOM) assembly	
d. Capable of local and remote operation	
e. Determines system status	
f. Used to configure terminal for communications	
4. OPERATE the OIU	
a. Operational Sequence	
(1) Power up	
(2) Operating system initialization	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Control	
b. Menu bars and hierarchy	
(1) Mainframe Menu Bar	
(2) Operations Window	
(3) Status Bar	
c. Mainframe Menu Bar	c. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-49.
(1) OIU	(1) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-50.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) Equipment	(2) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-51.
(3) Manuals	(3) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-52.
(4) Help	(4) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-53.
d. Operations Window	d. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-49 & 4-56.
(1) Hardware Profiles	(1) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-64.
(2) Diagnostic Profiles	(2) Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-96.

Topic 3.1 Operation of the OIU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
e. Status Bar	e. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, page 4-56.
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 3-1-2, Operation of the OIU.
8. Job Sheet	8. Refer trainee to Job Sheet 3-1-3, Operation of the OIU.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.2 Operation of the Modem Processor Assembly

CLASS PERIODS: 3
LAB PERIODS: 8
PA PERIODS: 0

Enabling Objectives:

3.4 **STATE** the purpose of the Modem Processor Assembly in accordance with applicable technical manuals

3.5 **DESCRIBE** the operational characteristics of the Modem Processor Assembly in accordance with applicable technical manuals

3.6 **OPERATE** the Modem Processor Assembly in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the Modem Processor Assembly, Outline Sheet 3–2–1
   b. Operation of the MPA, Job Sheet 3–2–2
   c. Operation of the Modem Processor Assembly, Assignment Sheet 3–2–3

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.2 Operation of the Modem Processor Assembly

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-2-1, Operation of the Modem Processor Assembly.
2. STATE the purpose of the Modem Processor Assembly in accordance with applicable technical manuals	
a. Houses 2 MD-1030B modems and the terminal Input-Output Manager (IOM) assembly that facilitates baseband to IF and RF terminal equipment interfacing, system monitoring and control	
3. DESCRIBE the operational characteristics of the Modem Processor Assembly in accordance with applicable technical manuals	
a. Interfaces with baseband equipment	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
b. Interfaces each modem modulator/demodulator with RF equipment	
c. Uses 5Mhz reference clock for timing	
d. Interfaces IOM with monitor and control circuitry of equipment in RF cabinet	
e. Interfaces with OIU	
f. IF frequency 52-88Mhz 1Khz steps	
g. BPSK, QPSK, OQPSK	
h. 9.6Kbps - 2.048Mbps	
i. Acts as DCE for baseband equipment	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
j. Built in 128 Kilobit doppler buffer	
4. OPERATE the Modem Processor Assembly in accordance with applicable technical manuals	
a. Startup	
(1) Power up	
b. Controls	b. Page 4-17 and A10 & A11.
(1) Local front panel	
(2) Most control functions performed via the OIU	
c. Indicators	c. Page 4-17 and A10 & A11.

Topic 3.2 Operation of the Modem Processor Assembly

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Front Panel	
(2) OIU	
(a) Main Operations Window	(a) Page 4-33.
1) Color Codes	1) Green - OK Yellow - Warning Red - Fault.
2) View current status/parameters, and configure different units of the SSCT	
(b) Terminal Window	(b) Page 4-37.
(c) Equipment Pull-Down menu	(c) Page 4-30.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1) Hardware Profiles	1) Page 4-45.
2) Diagnostic Profiles	2) Page 4-62.
5. Safety	
6. Review and Summary	6. Other Units' configuration and status will be discussed in their respective lesson topics.
7. Job Sheet	7. Direct trainee to perform Job Sheet 3-2-2, Operation of the MPA, The purpose of this Job Sheet is to familiarize the student with the Operation Procedures of the Modem Processor Assembly.
8. Assignment Sheet	8. Refer trainee to Assignment Sheet 3-2-3, Operation of the Modem Processor Assembly.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.3 Operation of the RF Ancillary Equipment

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

3.7 **STATE** the purpose of the RF Ancillary Equipment in accordance with applicable technical manuals

3.8 **DESCRIBE** the operational characteristics of the RF Ancillary Equipment in accordance with applicable technical manuals

3.9 **OPERATE** the RF Ancillary Equipment in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the RF Ancillary Equipment, Outline Sheet 3–3–1
   b. Operation of the RF Ancillary Equipment, Assignment Sheet 3–3–2
   c. Operation of the RF Ancillary Equipment, Job Sheet 3–3–3

LESSON PLAN

Topic 3.3 Operation of the RF Ancillary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-3-1, Operation of the RF Ancillary Equipment.
2. STATE the purpose of the RF Ancillary Equipment	
a. Isolation Transformer	
(1) Receives ship's 440 VAC, 3 phase (Delta) and provides 208 VAC, 3 phase (WYE) power to the Power Control Assembly.	
b. Powe Control Assembly	
(1) Provides single point power control for the equipment rack	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. IF Patch Panel	
(1) Provides single patching for internal and external signal input/output	
d. Spectrum Analyzer Assembly	
(1) Provides signal monitoring and measurement capabilities for RF and IF testing	
e. Control Chassis	
(1) Performs HPA mute / inhibit control, DC power generation for transmit switch, 5MHz frequency standard, EMCON control, provides ship's ID and validates blockage profile, and provides handover signal	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
f. Ethernet Hub	
(1) Provides the interface between local and remote OIU's and Input / Output manager of the Modem Processor Assembly	
g. Ethernet Transceiver	
(1) Provides connection between DTE equipped with and Attachment Unit Interface (AUI) to the 10-BaseT Local Area Network.	
3. DESCRIBE the operational characteristics of the RF Ancillary Equipment in accordance with Satellite Communication Set AN/WSC-6A(V)9, 3079068-102	
a. Isolation Transformer	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Receives ship's 440 VAC, 3 phase delta power and steps down to 208 VAC, 3 phase WYE power supplying the equipment rack	
b. Power Control Assembly	
(1) Receives 208 VAC, 3 phase from the Isolation Transformer at J1	
(2) Power is routed through circuit breaker CB1 (45 amp shunt breaker)	
(3) Thermal sensor to provide overtemp protection	
(4) EMI filter to remove spurious noise	
c. Intermediate Frequency Patch Panel	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Supporting interfaces for two modems	
(2) 50-ohm RCA type looping plugs	
(3) Patch cords available for cross patching of signals	
d. Spectrum Analyzer Assembly	
(1) Measures frequencies between 1-1250 MHz	
(2) Frequency Converter located in the chassis with the Spectrum Analyzer and converts C and X band frequencies down to the operational level of the Spectrum Analyzer	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Rotary Switch allows selectable input of C band transmit/ receive, X band transmit / receive, direct injection of frequencies between 1-1250 MHz and external output	
e. Control Chassis	
(1) Controls and Indicators divided into three sections	
(a) HPA Output Power Disable	
1) EMCON HPA Mute	
2) ACU HPA Inhibit	
3) Polarizer Move Inhibit	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) Transmit Circular Polarization	
1) Selector knob for Left-Hand or Right-Hand Polarization of transmit signal in C-Band	
2) Position Status Indicators (4) to identify polarization status for each antenna	
(c) AC Power	
1) On / Off Toggle Switch	
(2) 24 VDC power supply to power transmit handover switch via the Antenna Control Unit	
f. Ethernet Hub	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Contains (8) 10 Mbps ethernet ports	
(2) Has link and receive lights for status and monitoring of individual port status	
(3) LEDs for monitoring hub power and collision status	
g. Ethernet Transceiver	
(1) Attachment Unit Interface (AUI) to 10BASE-T Ethernet Local Area Network	
(2) LEDs for monitoring Link status, Collisions, Transmit and Receive status	

Topic 3.3 Operation of the RF Ancillary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. OPERATE the RF Ancillary Equipment in accordance with Satellite Communication Set AN/WSC-6A(V)9, 3079068-102	4. Refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Table 4-19.
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 3-3-2, Operation of the RF Ancillary Equipment.
8. Job Sheet	8. Refer trainee to Job Sheet 3-3-3, Operation of the RF Ancillary Equipment.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.4 Operation of the RF/IF Equipment

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

3.10 **STATE** the purpose of the RF/IF Assembly in accordance with applicable technical manuals

3.11 **DESCRIBE** the operational characteristics of the RF/IF Assembly in accordance with applicable technical manuals

3.12 **OPERATE** the RF/IF Assembly in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the RF/IF Equipment, Outline Sheet 3–4–1
   b. Operation of the RF/IF Equipment, Assignment Sheet 3–4–2
   c. Operation of the RF/IF Equipment, Job Sheet 3–4–3

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-4-1, Operation of the RF/IF Equipment.
2. STATE the purpose of the RF/IF Equipment in accordance with applicable technical manuals	
a. Frequency Upconversion	
b. Frequency Downconversion	
c. RF Patching	
d. Receive Antenna Handover Switching	
e. 5 MHz Reference Frequency Distribution	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
f. Frequency Test Translation	
3. DESCRIBE the operational characteristics of the RF/IF Equipment in accordance with applicable technical manuals	
a. Transmit Subsystem	
(1) Accepts 70 / 700 MHz IF from the MPA	
(a) C-Band = 5850 - 6425	
(b) X-Band = 7900 - 8400 MHz	
(2) Routed to Fine Tune Upconverters (FTUC)	
(a) Input center frequencies of either 70 or 700 MHz IF	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) Outputs L-Band frequencies of:	
1) C-Band 1350-1925 MHz	
2) X-Band 1500-2000 MHz in 1 KHz steps	
(c) On-board micro-controller provide all command, control and status to and from the FTUC and the IO Manager via RS-485 connection	
(d) Front Panel Controls and Indicators	
1) J1 RS-232 DB-9 serial interface for control and status	
2) J2 70 MHz inject	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3) DC Power LED indicates good +/- 12 VDC and +5 VDC inputs	
4) SUM FLT Ref Oscillator or CCA fault	
5) REF OSC FLT indicates 5 MHz reference not present	
6) TX Mute indicates inhibit of L-Band output	
7) Spare indicators not used	
8) DC Power Toggle Switch power On and Off	

(3) Outputs L-Band signal to Block Upconverter

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Accepts input frequencies of:	
1) C-Band - 1350-1925 MHz	
2) X-Band - 1500-2000 MHz	
(b) Performs final up conversion to selected transmit frequency for either X-Band or C-Band	
1) Onboard microcontroller communicates to the terminal processor via RS-485 interface	
(c) Front panel power toggle switch provides +5 VDC and +/- 12 VDC to the Block Upconverter	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(d) J1 - RS-232 Control and Status Interface	
(e) SUM FLT Ref OSC Fault or CCA fault	
(f) REF OSC FLT 5 MHz Ref not present	
(g) C-Band indicator identifies C-Band is selected	
(h) X-Band indicator identifies X-Band is selected	
b. Receive Subsystem	
(1) Block Downconverter (BDC)	

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Receives RF input from Low Noise Amplifier (LNA) at frequencies of: C-Band: 3700-4200 MHz X-Band: 7250-7750 MHz and downconverts these frequencies to L-Band: C-Band: 1500-2000 MHz X-Band: 1250-1750 MHz	
(b) Onboard micro-controller provides all command, control, and status to and from BDC via RS-485 interface to the terminal processor.	
(c) Front Panel Controls and Indicators	

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1) Front panel power toggle switch provides +5 VDC and +/- 12 VDC to the Block Upconverter	
2) J2 Not Used	
3) DC Power LED indicates good +/- 12 VDC and +5 VDC inputs	
4) SUM FLT Ref OSC fault or CCA fault	
5) REF OSC 5 MHz reference not present	
6) C BAND Indicates C-Band selected	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7) X BAND Indicates X-Band selected	
8) KU BAND Not Used	
(2) Fine Tune Downconverter (FTDC)/Tracking Downconverters	
(a) FTDC/Tracking Downconverters are mechanically and electrically identical and can be used interchangeably	
(b) Receives input from the BDC in the L-Band frequency range of 1250-2000 MHz tunable in 1 KHz steps	
(c) Downconverts L-Band input to desired IF frequency (70-700 MHz) and routes output to Modem	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(d) Onboard micro-controller provides all command, control, and status to and from BDC via RS-485 interface to the terminal processor	
(e) Front Panel Controls and Indicators	
1) Front panel power toggle switch provides +5 VDC and +/- 12 VDC to the Block Upconverter	
2) J2 Not Used	
3) DC Power LED indicates good +/- 12 VDC and +5 VDC inputs	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4) SUM FLT Ref OSC fault or CCA fault	
5) REF OSC 5 MHz reference not present	
6) C BAND Indicates C-Band selected	
7) X BAND Indicates X-Band selected	
8) KU BAND Not Used	
c. RF/IF Assembly Controls and Indicators	c. Refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Figure/Table 4-5.

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Provides signal path for normal through operations based on selection of X or C-Band Transmission	
(2) Provides RF loopback jacks to route RF signal through Block Up/Down Converters and Fine Tune Up/Down Converters for troubleshooting	
(3) Provides RF Test Translation to frequencies acceptable to the Spectrum Analyzer Assembly for monitoring and troubleshooting	
(4) RF Uplink Monitor for testing of BUC and HPA signals	
(5) RF Downlink monitor for testing LNA and BDC signals	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(6) Voltage test points for testing presence of +5 VDC and +/- 12 VDC	
(7) AC Power On/Off switch	
(8) Rear Panel connections for monitoring and testing of AC input, HPA monitor input, BUC Out, 70 MHz monitoring of Port/Starboard BDC, Port/Starboard Tracking Downconverter, Fine Tune Up/Downconverters, RS-485 Control and Status, Handover switch control and 5 MHz Reference Signal Distribution	
4. OPERATE the RF/IF Equipment in accordance with applicable technical manuals	4. Refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Figure/Table 4-5.
5. Safety	
6. Review and Summary	

Topic 3.4 Operation of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7. Assignment	7. Direct trainee to Assignment Sheet 3-4-2, Operation of the RF/IF Equipment.
8. Lab	8. Direct trainee to perform Job Sheet 3-4-3, Operation of the RF/IF Equipment.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.5 Operation of the HPA and HVPS

CLASS PERIODS: 2
LAB PERIODS: 1
PA PERIODS: 0

Enabling Objectives:

3.13 **STATE** the purpose of the HPA and HVPS in accordance with applicable technical manuals

3.14 **DESCRIBE** the operational characteristics of the HPA and HVPS in accordance with applicable technical manuals

3.15 **OPERATE** the HPA and HVPS in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102
2. XICOM Technology Digital M&C System User's Guide, User Guide

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the HPA and HVPS, Outline Sheet 3–5–1
   b. Operation of the HPA and HVPS, Assignment Sheet 3–5–2
   c. Operation of the HPA/HVPS, Job Sheet 3–5–3

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.5 Operation of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-5-1, Operation of the HPA and HVPS.
2. STATE the purpose of the HPA and HVPS in accordance with applicable technical manuals	
a. Consists of two modules: The RF Assembly and the High Voltage Power Supply (HVPS).	
b. Amplification of uplink signal	b. Direct trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Page 1-40.
c. High Voltage Power Supply provides the voltages necessary to drive the TWTA for amplification of the uplink signal	

Topic 3.5 Operation of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3. DESCRIBE the operational characteristics of the HPA and HVPS in accordance with applicable technical manuals	
a. Receives output from BUC and amplifies the signal to the desired level for transmit to the satellite.	
(1) 1200 watts in X-band	
(2) 800 watts in C-band	
b. Can be operated from either the front panel or the serial interface (OIU)	b. Refer to XICOM Technology Digital M&C System User's Guide, User Guide, page 1-1 through 1-4.
(1) Controls and Indicators	
(a) Special Function Keys	

Topic 3.5 Operation of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1) HV On	
2) HV Off	
3) Setup	
4) Enable	
5) Status1	
6) Status2 - Displays Status 2 menu	
7) Enter: confirms selection Pressed to go back one level from the current selection	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) 10 key number pad/Clear Key	
4. OPERATE the HPA and HVPS in accordance with applicable technical manuals	4. Refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102.
5. Safety	
6. Review and Summary	
7. Assignment	7. Direct trainee to perform Assignment Sheet 3-5-2, Operation of the HPA and HVPS.
8. Job Sheet	8. Direct trainee to perform Job Sheet 3-5-3, Operation of the HPA/HVPS.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.6 Operation of the ACU

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

3.16 **STATE** the purpose of the ACU in accordance with applicable technical manuals

3.17 **DESCRIBE** the operational characteristics of the ACU in accordance with applicable technical manuals

3.18 **OPERATE** the ACU in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the ACU, Outline Sheet 3–6–1
   b. Operation of the Antenna Control Unit, Job Sheet 3–6–2
   c. Operation of the ACU, Assignment Sheet 3–6–3

Topic 3.6 Operation of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-6-1, Operation of the ACU.
2. STATE the purpose of the ACU in accordance with applicable technical manuals	
a. Provides antenna pointing and tracking control for single and dual antenna configurations.	
(1) Generates Stabilization control signals	
(2) Processes satellite beacon signal for tracking	
(3) Performs LOS blockage assessment	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(4) Generates control signals from commands issued at the OIU	
(5) Generates the control signals for the transmit and receive handover switches	
3. DESCRIBE the operational characteristics of the ACU in accordance with applicable technical manuals	
a. SEA/HBR switch located on front panel provides additional safety from emissions control inport.	
b. Three modes of operation	
(1) Standby	
(2) Line of Site (LOS)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Tracking	
c. Antenna Processor Module	c. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-17 Antenna Processor Module Block Diagram.
(1) Communicates with the OIU via serial communications port to support antenna/ACU control and status data transfer.	
(2) Incorporates a 32-bit processor, volatile memory for operational data storage and non-volatile memory for storage of system operational parameters.	
d. Analog Interface Module	d. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-18 Antenna Processor Module Block Diagram.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Provides the interface between the APM's digital data and the analog control and feedback signals within the ACU from the antenna(s) and the ships gyrocompass.	
(2) Control and monitoring is performed by the APM via the VME bus.	
e. Wooded Arc Module	e. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-19 Wooded Arc Module Block Diagram.
(1) Provides emissions protection from RF transmission	
(2) Receives signals from the antenna's resolvers to discern the antenna's pointing angle which is compared to the ships blockage profile in the module's memory.	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Boundry signal is then sent to the Handover Module to indicate "blocked" or "clear"	
(4) System control and BIT interfaces are accessed via the VME bus	
f. Antenna Handover Module	f. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-20 Antenna Handover Module Block Diagram.
(1) Receives Blocked and Clear signals from the Wooded Arc Module and generates an HPA Mute Signal to the blocked antenna	
(2) Generates drive signals for the transmit and receive handover switches based on handover signals from the Analog Interface Module.	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Will generate HPA mute if any of the following conditions are met: Radome hatch interlock is active The tracking signal for the primary antenna is below threshold The SERVO ON key switch for the primary antenna is switched off During antenna initialization While the transmit and receive waveguide switches are handing over Toggling the transmit test mute switch on the Antenna Handover Module front panel If the transmit and/or receive switch status does not match the drive signal output	
g. Dual Beacon Detect Module	g. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-21 Dual Beacon Detect Module Block Diagram.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Receives 70 MHz IF tracking signals from the Beacon FTDC's and converts them to an analog signal strength for the Analog Interface Module for processing by the Antenna Processor Module for positioning and tracking of the satellite.	
h. Servo Amplifier Module	h. Refer trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, figure 3-22 Servo Amplifier Module Block Diagram.
(1) Three Servo Amplifier Modules per antenna: Training (TRNG) Cross-Elevation (X-EL) Elevation (EL)	
(2) Uses a Pulse Width Modulation final stage to form a servo control loop which controls the gimbal drive motor	

Topic 3.6 Operation of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
i. 400 Hz Reference Generator	
(1) Generates a 26V, 400 Hz required by the antenna resolvers and the WAM resolver-to-digital converters	
(2) Sends a "400Hz OK" signal back to the WAM and the front panel LED of the module	
j. Power Supply Unit +5, +/-15, +24VDC	
(1) Produces voltages used by the ACU modules	
(2) +24VDC output to the antenna to the Accelerometer, Gyros, and LNA	
k. Power Supply Unit +48VDC	

Topic 3.6 Operation of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Used by the Servo Amplifier Modules to generate motor drive current for the antenna's three motors	
4. OPERATE the ACU in accordance with applicable technical manuals	4. Refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102.
5. Safety	
6. Review and Summary	
7. Job Sheet	7. Direct trainee to perform Job Sheet 3-6-2, Operation of the Antenna Control Unit.
8. Assignment	8. Direct trainee to perform Assignment Sheet 3-6-3, Operation of the ACU.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.7 Operation of the Antenna/Pedestal Group

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

3.19 **STATE** the purpose of the Antenna/Pedestal Group in accordance with applicable technical manuals

3.20 **DESCRIBE** the operational characteristics of the Antenna/Pedestal Group in accordance with applicable technical manuals

3.21 **OPERATE** the Antenna/Pedestal Group in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the Antenna/Pedestal Group, Outline Sheet 3–7–1
   b. Operation of the Antenna/Pedestal Group, Assignment Sheet 3–7–2
   c. Operation of the Antenna Control Unit, Job Sheet 3–7–3

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.7 Operation of the Antenna/Pedestal Group

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-7-1, Operation of the Antenna/Pedestal Group.
2. STATE the purpose of the Antenna/Pedestal Group in accordance with applicable technical manuals	2. Cosists of a dual band, high gain antenna mounted to a 3-axis stabilized pedestal for tracking of geo-synchrous satellites in the presence of shipboard motion.
a. Reflector - Provides highly concentrated directional beam of RF for transmission to the satellite	
b. Transmit Components	
(1) Waveguide, rotary joints, filters	
c. Receive Components	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Filter - filters out extraneous emissions from the receive path	
(2) Low Noise Amplifier (LNA) - Amplifies receive signal from satellite without adding noise	
(3) LNA select switch - selects proper LNA for use with X or C-Band	
d. Ring Focus Feed Assemblies	
(1) Separate feed assemblies for X and C-Band	
(2) Orthomode Transducer (OMT)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Separates transmit and receive signals and insures that they are on orthogonal polarization (Polarization in which the transmit and receive are at right angles to one another to prevent signal cancellation)	
(3) Polarizer	
(a) Generates circular polarization required for use with commercial and military satellites	
(b) C-Band = selectable Right Hand Circular Polarization (RHCP) or Left Hand Circular Polarization (LHCP) for transmit/receive	
(c) X-Band = RHCP transmit, LHCP receive	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(4) Scalar Feed Horn/ Subreflector	
(a) Illuminate the main reflector to produce a highly directive beam at transmit frequencies	
(b) Collects receive signals from the main reflector and passes them on to the receive chain via the Polarizer and the OMT	
(c) X-Band feed assembly contains filters to eliminate interference when in dual carrier configuration.	
3. DESCRIBE the operational characteristics of the Antenna/Pedestal Group in accordance with applicable technical manuals	

Topic 3.7 Operation of the Antenna/Pedestal Group

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
a. Reflector	
(1) Provides isotropic amplification of the transmit/receive RF as a property of the shape of the antenna with an EIRP of 37.5 DBi at C-Band and 40.3 DBi at X-Band	
b. Transmit Components	
(1) Waveguide, rotary joints and filter	
c. Receive Components	
(1) Filter - Provides minimum loss in the receive spectrum and maximum rejection of signals in the transmit spectrum	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) LNA - High Electron Mobility Transistor(HEMT)/Gallium Arsenide (GaAs) Field Effect Transistor (FET) used to amplify very small receive signal from the satellite while introducing no noise to the signal.	
(3) Provides 60dB gain	
(4) LNA Select Switch	
d. Ring Focus Feed Assemblies	
(1) Separate feed assemblies for X and C-Band	
(2) Orthomode Transducer (OMT)	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Separates transmit and receive signals and insures that they are on orthogonal polarization (Polarization in which the transmit and receive are at right angles to one another to prevent signal cancellation)	
(3) Polarizer	
(a) Generates circular polarization required for use with commercial and military satellites	
(b) C-Band = selectable Right Hand Circular Polarization (RHCP) or Left Hand Circular Polarization (LHCP) for transmit/receive	
(c) X-Band = RHCP transmit, LHCP receive	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(4) Scalar Feed Horn/ Subreflector	
(a) Illuminate the main reflector to produce a highly directive beam at transmit frequencies	
(b) Collects receive signals from the main reflector and passes them on to the receive chain via the Polarizer and the OMT	
(c) X-Band feed assembly contains filters to eliminate interference when in dual carrier configuration.	
4. OPERATE the Antenna/Pedestal Group in accordance with applicable technical manuals	
5. Safety	

Topic 3.7 Operation of the Antenna/Pedestal Group

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 3-7-2, Operation of the Antenna/Pedestal Group.
8. Job Sheet	8. Refer trainee to Job Sheet 3-7-3, Operation of the Antenna Control Unit.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.8 Operation of the RF equipment as a system

CLASS PERIODS: 1
LAB PERIODS: 12
PA PERIODS: 0

Enabling Objectives:

3.22 **OPERATE** the RF equipment as a system in accordance with applicable technical manuals

3.23 **OPERATE** the AN/WSC-6A(V)9 as a system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Operation of the RF equipment as a system, Outline Sheet 3–8–1
   b. Operation of the RF equipment as a system, Job Sheet 3–8–2
2. Equipment
   a. AN/WSC-6(v)9 Satellite Communications Set

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.8 Operation of the RF equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 3-8-1, Operation of the RF equipment as a system.
2. OPERATE the RF equipment as a system in accordance with applicable technical manuals	
3. Safety	
a. Personnel	
(1) Multiple Power Sources	
(2) Moving Antenna	(2) Show student yellow safety chain encompassing antenna movement capability.

Topic 3.8 Operation of the RF equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Emergency Power Off	(a) Show student Emergency cut-off switch.
(b) TTO	
b. Equipment	
(1) ESD	
4. Review and Summary	
5. OPERATE the AN/WSC-6A(V)9 as a system in accordance with applicable technical manuals	5. Direct trainee to operate the AN/WSC-6(v)9 Satellite Communications Set in accordance with the appropriate technical manuals.
6. Job Sheet	6. Direct trainee to perform Job Sheet 3-8-2, Operation of the RF equipment as a system.

LESSON PLAN

Unit 3. OPERATION OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 3.8 Operation of the RF equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7. Knowledge Test	7. Administer Knowledge Test 2K.
8. Performance Test	8. Administer Performance Test 2P.

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.1 Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)x

CLASS PERIODS: 2
LAB PERIODS: 0
PA PERIODS: 0

Enabling Objectives:

4.1 **TEST** the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

4.2 **TROUBLESHOOT** the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

4.3 **DESCRIBE** the maintenance requirements for the Ancillary equipment required for the AN/WSC-6A(V)9 in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Fireberd 6000 Manual, EE-130-BJ-MMC-010 (0913-LP-022-6740)
2. SB-4124 MULTIPURPOSE PATCH PANEL, 0913-LP-160-9800/EE167-JA-OMI-010

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)X, Outline Sheet 4–1–1
   b. Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)X, Assignment Sheet 4–1–2

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.1 Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 4-1-1, Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)X.
2. DESCRIBE the maintenance requirements for the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	
a. COS	
(1) Power up tests	
b. Patch Panel	b. Direct trainee to SB-4124 MULTIPURPOSE PATCH PANEL, 0913-LP-160-9800/EE167-JA-OMI-010.
(1) None	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. Break-Out Panel	
(1) None	
d. Oscilloscope	
(1) Operator Initiated Selt Test	
e. Bit Error Rate Tester (BERT)	e. Direct trainee to Fireberd 6000 Manual, EE-130-BJ-MMC-010 (0913-LP-022-6740).
3. TROUBLESHOOT the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	
a. COS	a. Direct trainee to COS manual chapter 8.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) General Troubleshooting List	
(2) Diagnostics	
(a) Long Test Sequence Without Loopback	
(b) Long Test Sequence With Loopback	
(c) Short Test Sequence	
b. Patch Panel	
(1) Swap "Slice"	
c. Break Out Panel	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) None	
d. Oscilloscope	
(1) Turn in to local FCA	
e. Bit Error Rate Tester (BERT)	
(1) Turn in to local FCA	
4. Safety	
5. Review and Summary	
6. Troubleshoot the Ancillary equipment	6. Direct trainee to Assignment Sheet 4-1-2, Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)X.

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.1 Maintenance of the Ancillary equipment required for the AN/WSC-6A(V)x

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7. TROUBLESHOOT the Ancillary equipment required for the AN/WSC-6A(V)X in accordance with applicable technical manuals	

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.2 Maintenance of the AN/FCC-100(V)9

CLASS PERIODS: 2
LAB PERIODS: 3
PA PERIODS: 0

Enabling Objectives:

4.4 **TEST** the AN/FCC-100(V)9 in accordance with applicable technical manuals

4.5 **TROUBLESHOOT** the AN/FCC-100(V)9 in accordance with applicable technical manuals

4.6 **DESCRIBE** the maintenance requirements for the AN/FCC-100(V)9 in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. User Manual, AN/FCC-100(V)9 Time Division Multiplexer, -

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the AN/FCC-100(V)9, Outline Sheet 4–2–1
   b. Maintenance of the AN/FCC-100(V)9, Assignment Sheet 4–2–2
   c. Maintenance of the AN/FCC-100(V)9, Job Sheet 4–2–3

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.2 Maintenance of the AN/FCC-100(V)9

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Direct trainee to Outline Sheet 4-2-1, Maintenance of the AN/FCC-100(V)9.
2. TEST the AN/FCC-100(V)9 in accordance with applicable technical manuals NOTE: Testing is for determining whether fault is within the AN/FCC-100(V)9 or the other units	2. Refer trainee to User Manual, AN/FCC-100(V)9 Time Division Multiplexer, -.
a. Loopbacks	
(1) Aggregate	
(a) Local	
(b) Remote	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) Port	
3. TROUBLESHOOT the AN/FCC-100(V)9 in accordance with applicable technical manuals	
NOTE: Troubleshooting is to determine what is faulty within the AN/FCC-100(V)9	
a. Alarm reporting	
(1) FAULT indicator on front panel	
(2) OPERATION ALARM is displayed	
(a) Displaying alarm messages	(a) Alarms listed on page 6-6.
1) Down Arrow	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
2) STATUS then ALARM (Menu)	
a) Current	
b) Previous	
b. BIT	
(1) ONLINE	(1) ONLINE BIT runs continuously during operation. Detects major faults in the Processor, MUX/DEMUX, Aggregate, Port carrier, and power supply. Isolates fault to the LRU except port carrier submodules. FAULT indicator and OPERATION ALARM displays status. Most of the hardware signals are available on the front of the cards on Test points.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(a) Test Points and Flow charts	(a) Use of test points allows testing without disrupting traffic on other circuits.
(2) OFFLINE	(2) Performs cyclical (non-stop) testing of all common and user specified modules. Execution of OFFLINE BIT interrupts user traffic. Isolates fault to the LRU except port carrier submodules. RESTART must be depressed to stop test. Tests described on page 6-12.
c. Loss of Front Panel	
(1) Flowchart and Indicators	
d. Strapping	

Topic 4.2 Maintenance of the AN/FCC-100(V)9

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. DESCRIBE the maintenance requirements for the AN/FCC-100(V)9 in accordance with applicable technical manuals	
a. PMS	
b. Technical Manual	
5. Safety	
6. Review and Summary	
7. Assignment	7. Direct trainee to Assignment Sheet 4-2-2, Maintenance of the AN/FCC-100(V)9.
8. Maintain the AN/FCC-100(V)9	8. Direct trainee to perform Job Sheet 4-2-3, Maintenance of the AN/FCC-100(V)9.

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.3 Maintenance of the TIMEPLEX LINK system

CLASS PERIODS: 4
LAB PERIODS: 10
PA PERIODS: 0

Enabling Objectives:

4.7 **TEST** the TIMEPLEX LINK system in accordance with applicable technical manuals

4.8 **TROUBLESHOOT** the TIMEPLEX LINK system in accordance with applicable technical manuals

4.9 **DESCRIBE** the maintenance requirements requirements for the TIMEPLEX LINK system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813
2. TIMEPLEX Group LINK 2+ Users Guide, MC15811

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the TIMEPLEX LINK system, Outline Sheet 4–3–1
   b. Maintenance of the TIMEPLEX LINK system, Assignment Sheet 4–3–2
   c. Maintenance of the TIMEPLEX LINK system, Job Sheet 4–3–3

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 4-3-1, Maintenance of the TIMEPLEX LINK system.
2. TEST the TIMEPLEX LINK system in accordance with applicable technical manuals	
a. Self Test	
(1) Checks hardware and firmware of the TimePlex system	(1) Discuss when self-test is performed. A complete system self-test is performed after applying power, entering an RST command for the online NCL module, & toggling RESET switch on the online NCL. During operation, the NCL monitors for alarm of hardware error conditions.
b. System Status Evaluation	

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) DSP DST CH/DS0 #	(1) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-32.
(2) DSP FN (Display EIA functions)	(2) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-38.
(3) DSP HIS (10 most recent alarms)	(3) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-40.
(4) DSP PPN (Display PROM part number)	(4) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-49.
(5) DSP REV	(5) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-52.
(6) DSP SIG DS0 (n:ss:cc)	(6) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-54.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(7) DSP ST CLK	(7) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-76.
(8) DSP ST DL #	(8) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-81.
(9) DSP ST QUA	(9) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 5-93.
(10) CON DR	(10) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 6-48. Used in conjunction with LP LB DL # (Allows for "in-house" testing of baseband ckts without having an established link).
(11) BSY (Busy Out DS0)	(11) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-9.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(12) MON (L or R n:ss:cl)	(12) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-61. Cleared using CLR MG command.
(13) RST PS	(13) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-67. Tests for faulty power supply module (Doesn't apply to p/n AW00642-1 PS modules).
(14) SET CKS (set database checksum)	(14) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-67.
(15) SET RLY / CLR RLY	(15) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-9.
(16) Test DS0 (n:ss:cc)	(16) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-75.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(17) DSP CKS	(17) Discuss how this command is only utilized if a checksum exists.
c. BERT	
(1) Test pattern	
d. Loopback Testing (Local/Remote)	d. Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, Loopback Plugs page 7-33.
(1) Commands	
(a) LP LB CH (n:ss:cc) / CLR CH (n:ss:cc)	(a) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-12.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) LP RB CH (n:ss:cc) / CLR CH (n:ss:cc)	(b) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-12.
(c) LP LB DL # / CLR DL #	(c) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-23.
(d) LP RB DL # / CLR DL #	(d) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-23.
(e) LP DS0 BI (n:ss:cc) CLR DS0 BI (n:ss:cc)	(e) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-40.
(f) LP DS1 BI (n:ss) / CLR DS1 BI (n:ss)	(f) Direct trainee to TIMEPLEX Group LINK 2+ Users Guide, MC15811, page 7-48.

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3. TROUBLESHOOT the TIMEPLEX LINK system in accordance with applicable technical manuals	
a. Normal/Degraded Operational Indications	a. Discuss how faults can be caused by the Timeplex or attached equipment (requiring the complete system to test).
(1) LOS/ROS	
(2) Fault/Alarm Indicators	
b. Module Level Troubleshooting	b. Troubleshooting repair consists of module level replacement.
c. Utilization of Alarm and Error codes	c. Discuss DSP AQ/C command modifier along with Alarm number & Error message troubleshooting tables of technical manuals.

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Alarm Number Troubleshooting	
(a) DSP ST ALM	(a) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 8-3, Table 8-1.
(2) Error Message Troubleshooting	
(a) DSP ERR	(a) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 8-9, Table 8-2 & User Manual Appendix A.
(3) Troubleshooting using module indicators	(3) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 8-14, Table 8-3.
(4) Functional circuit operation and signal evaluation	(4) Discuss required signals (TC, RC, TD, RD) and relationship to DCE or DTE devices.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(5) Interfaces	(5) Discuss how different modules require different interfaces because of varying pin-outs. Direct trainee to Appendix A of the I & M manual.
4. DESCRIBE the maintenance requirements requirements for the TIMEPLEX LINK system in accordance with applicable technical manuals	
a. Preventative Maintenance	a. Direct trainee to the Preventative Maintenance System.
b. Corrective Maintenance	
(1) Jumper/DIP switch settings	
(a) NCL	(a) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 23-5.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(b) ILC	(b) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 15-3.
(c) QSC	(c) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 30-3.
(d) ILP	(d) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 17-3.
(e) BIM	(e) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 18-4.
(f) FXS/FXO	(f) Direct trainee to TIMEPLEX Group LINK 2+ Installation and Maintenance, MC15813, page 36-7.

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
5. Safety	
6. Personnel	
a. Multiple Power Supplies	
7. Equipment	
a. IRP Cable and switches	
b. ESD	
8. Review and Summary	
9. Assignment	9. Direct trainee to Assignment Sheet 4-3-2, Maintenance of the TIMEPLEX LINK system.

Topic 4.3 Maintenance of the TIMEPLEX LINK system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
10. Troubleshoot the Timeplex system	10. Direct trainee to perform Job Sheet 4-3-3, Maintenance of the TIMEPLEX LINK system.

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.4 Maintenance of the Cryptographic devices

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

4.10 **TEST** the Cryptographic devices required for the AN/WSC-6A(V)X in accordance with applicable technical manuals

4.11 **DESCRIBE** the maintenance requirements for the Cryptographic devices required for the AN/WSC-6A(V)X in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Limited Maintenance Manual for TSEC/KG-194/194A, KAM-529A/TSEC RP
2. Limited Maintenance Manual LMM-5A for TSEC/KG-84, 84A, EE187-BB-MMO-010/TSEC/KG-84,84A
3. Operators Manual Digital Subscriber Voice Terminal KY-68, TM11-5810-329-10
4. STE Office/Tactical (Secure Terminal equipment), OSTE-UM-1B Rev: 2

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the Cryptographic devices required for the AN/WSC-6A(V)X, Outline Sheet 4–4–1

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.4 Maintenance of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 4-4-1, Maintenance of the Cryptographic devices required for the AN/WSC-6A(V)X.
2. TEST the Cryptographic devices required for the AN/WSC-6A(V)X in accordance with applicable technical manuals NOTE: Only certified technicians are permitted to troubleshoot within any Cryptographic device including any strapping	
a. KG-194A	a. Refer trainee to Limited Maintenance Manual for TSEC/KG-194/194A, KAM-529A/TSEC RP.
(1) Strapping	(1) Refer to the KG-194 circuit standardization manual.

Topic 4.4 Maintenance of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) Crypto Resync Signal	(2) Check pins 20 and 23 at B.O.P. and /or at pins 3 and 7 at back of TIMEPLEX ILC slot for -5VDC. Only on Red side.
(3) CTS/RTS	(3) Passes RTS to DCE and CTS to DTE.
(4) Alarms Signal check	(4) On Black side pin 2 (low/no data) then your KG-194 is in an "Alarm condition. On Black side pin 3 (low/no data) then distant end is in an "Alarm" condition.
b. KG-84A	b. Direct trainee to Limited Maintenance Manual LMM-5A for TSEC/KG-84, 84A, EE187-BB-MMO-010/TSEC/KG-84,84A. Reload keying material/Swap Unit.
c. STU-III	c. Verify CIK/Swap unit.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
d. STE	d. Direct trainee to STE Office/Tactical (Secure Terminal equipment), OSTE-UM-1B Rev: 2. Verify Fortezza card/Swap Unit.
e. KY-68	e. Direct trainee to Operators Manual Digital Subscriber Voice Terminal KY-68, TM11-5810-329-10. Reload keying material/Swap Unit.

3. DESCRIBE the maintenance requirements for the Cryptographic devices required for the AN/WSC-6A(V)X in accordance with applicable technical manuals

   NOTE: Completion of this course does not certify technicians for internal maintenance or repair of any Cryptographic device

4. Safety

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.4 Maintenance of the Cryptographic devices

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
5. Review and Summary	
6. TEST the Cryptographic devices	

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.5 Maintenance of the Baseband as a system

CLASS PERIODS: 1
LAB PERIODS: 18
PA PERIODS: 0

Enabling Objectives:

4.12 **TROUBLESHOOT** the Baseband as a system in accordance with applicable technical manuals

4.13 **PERFORM** Preventative Maintenance in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the Baseband as a system, Outline Sheet 4–5–1
   b. Perform PMS on the Baseband equipment, Job Sheet 4–5–2
   c. Maintenance of the Baseband as a system, Assignment Sheet 4–5–3
   d. Maintenance of Baseband as a system, Job Sheet 4–5–4

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.5 Maintenance of the Baseband as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 4-5-1, Maintenance of the Baseband as a system.
2. TROUBLESHOOT the Baseband as a system in accordance with applicable technical manuals	
a. Interoperability	
3. PERFORM Preventative Maintenance in accordance with applicable technical manuals	3. Direct trainee to perform Job Sheet 4-5-2, Perform PMS on the Baseband equipment.
4. Safety	
a. Personnel	
(1) Multiple Power Sources	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) Moving Antenna	
(3) TTO	
b. Equipment	
(1) IRP Cable	
(2) ESD	
5. Review and Summary	
6. Troubleshoot the Baseband	6. Direct trainee to Assignment Sheet 4-5-3, Maintenance of the Baseband as a system. Direct trainee to perform Job Sheet 4-5-4, Maintenance of Baseband as a system.

LESSON PLAN

Unit 4. MAINTENANCE OF THE SHF BASEBAND EQUIPMENT **A-101-0145**

Topic 4.5 Maintenance of the Baseband as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
7. Knowledge Test	7. Administer Knowledge Test 3K.
8. Performance Test	8. Administer Performance Test 3P.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.1 Maintenance of the OIU

CLASS PERIODS: 1
LAB PERIODS: 0
PA PERIODS: 0

Enabling Objectives:

5.1 **TEST** the OIU in accordance with applicable technical manuals

5.2 **TROUBLESHOOT** the OIU in accordance with applicable technical manuals

5.3 **DESCRIBE** the maintenance requirements for the OIU in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the OIU, Outline Sheet 5–1–1
   b. Maintenance of the OIU, Assignment Sheet 5–1–2

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.1 Maintenance of the OIU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-1-1, Maintenance of the OIU.
2. TEST the OIU in accordance with applicable technical manuals	
a. Power-on self test	
3. TROUBLESHOOT the OIU in accordance with applicable technical manuals	
a. Loss of power	
b. Loss of connectivity	
c. Non-Operational or degraded performance	

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.1 Maintenance of the OIU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. DESCRIBE the maintenance requirements for the OIU in accordance with applicable technical manuals	
a. Preventive Maintenance	
b. Corrective Maintenance	
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 5-1-2, Maintenance of the OIU.
8. Maintain the OIU	

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.2 Maintenance of the Modem Processor Assembly

CLASS PERIODS: 2
LAB PERIODS: 6
PA PERIODS: 0

Enabling Objectives:

5.4 **TEST** the Modem Processor Assembly in accordance with applicable technical manuals

5.5 **TROUBLESHOOT** the Modem Processor Assembly in accordance with applicable technical manuals

5.6 **DESCRIBE** the maintenance requirements for the Modem Processor Assembly in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the Modem Processor Assembly, Outline Sheet 5–2–1
   b. Maintenance of the Modem Processor Assembly, Assignment Sheet 5–2–2

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.2 Maintenance of the Modem Processor Assembly

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-2-1, Maintenance of the Modem Processor Assembly.
2. TEST the Modem Processor Assembly in accordance with applicable technical manuals	
a. Power-Up Check	a. Page A-4 Comm set manual.
(1) Energize MPA ON/OFF switch	(1) Verify +5, +12, and -12VDC LEDs illuminate.
(2) Energize OIU	(2) observe OIU initializes and window displays the software version window.
b. Online Test	

Topic 5.2 Maintenance of the Modem Processor Assembly

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. Offline Self Test	c. Explain how Offline self test relates to the.
(1) Offline test window - allow user to perform offline testing of terminal	(1) Page A-27.
3. TROUBLESHOOT the Modem Processor Assembly in accordance with applicable technical manuals	
a. Normal/Degraded operational Indications	
b. Module Level Troubleshooting	
4. DESCRIBE the maintenance requirements for the Modem Processor Assembly in accordance with applicable technical manuals	
5. Safety	

Topic 5.2 Maintenance of the Modem Processor Assembly

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 5-2-2, Maintenance of the Modem Processor Assembly.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.3 Maintenance of the RF Ancillary Equipment

CLASS PERIODS: 2
LAB PERIODS: 2
PA PERIODS: 0

Enabling Objectives:

5.7 **TEST** the RF Ancillary Equipment in accordance with applicable technical manuals

5.8 **TROUBLESHOOT** the RF Ancillary Equipment in accordance with applicable technical manuals

5.9 **DESCRIBE** the maintenance requirements for the RF Ancillary Equipment in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the RF Ancillary Equipment, Outline Sheet 5–3–1
   b. Maintenance of the RF Ancillary Equipment, Assignment Sheet 5–3–2
   c. Maintenance of the AN/WSC-6A(V)9, Job Sheet 5–3–3

Topic 5.3 Maintenance of the RF Ancillary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-3-1, Maintenance of the RF Ancillary Equipment.
2. TEST the RF Ancillary Equipment in accordance with Satellite Communication Set AN/WSC-6A(V)9, 3079068-102	
a. Power Control Assembly	
b. IF Patch Panel	
c. Spectrum Analyzer Assembly	
d. Control Chassis	
e. Ethernet Hub	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
f. Ethernet Transceiver	
3. TROUBLESHOOT the RF Ancillary Equipment in accordance with Satellite Communication Set AN/WSC-6A(V)9, 3079068-102	
a. Power Control Assembly	
b. IF Patch Panel	
c. Spectrum Analyzer Assembly	
d. Control Chassis	
e. Ethernet Hub	
f. Ethernet Transceiver	

Topic 5.3 Maintenance of the RF Ancillary Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. DESCRIBE the maintenance requirements for the RF Ancillary Equipment in accordance with Satellite Communication Set AN/WSC-6A(V)9, 3079068-102	
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 5-3-2, Maintenance of the RF Ancillary Equipment.
8. Job Sheet	8. Direct trainee to perform Job Sheet 5-3-3, Maintenance of the AN/WSC-6A(V)9.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.4 Maintenance of the RF/IF Equipment

CLASS PERIODS: 1
LAB PERIODS: 3
PA PERIODS: 0

Enabling Objectives:

5.10 **TEST** the RF/IF Assembly in accordance with applicable technical manuals

5.11 **TROUBLESHOOT** the RF/IF Assembly in accordance with applicable technical manuals

5.12 **DESCRIBE** the maintenance requirements for the RF/IF Assembly in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the RF/IF Equipment, Outline Sheet 5–4–1
   b. Maintenance of the RF/IF Equipment, Assignment Sheet 5–4–2
   c. Maintenance of the AN/WSC-6A(V)9, Job Sheet 5–4–3

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.4 Maintenance of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-4-1, Maintenance of the RF/IF Equipment.
2. TEST the RF/IF Equipment in accordance with applicable technical manuals	
a. OIU Indications	
b. Front Panel Indications	
c. Loopback Testing	c. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Chapter 5 figure 5-1 Expanding Loops. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Section 5.3 page 5-6 through 5-8 Loopback Testing.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(1) Baseband Loopback	
(2) Modem Self-Test	
(3) Terminal IF Loopback	
(4) L-Band Loopback	
(5) Frequency Converter RF Loopback	
(6) LNA Loopback	
3. TROUBLESHOOT the RF/IF Equipment in accordance with applicable technical manuals	

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.4 Maintenance of the RF/IF Equipment

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. DESCRIBE the maintenance requirements for the RF/IF Equipment in accordance with applicable technical manuals	4. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Section 5.4.4 table 5.4.4.1 through 5.4.9.2.8 Fault Indications and Corrective Actions.
5. Safety	
6. Review and Summary	
7. Assignment	7. Direct trainee to operate the Assignment Sheet 5-4-2, Maintenance of the RF/IF Equipment.
8. Job Sheet	8. Direct trainee to perform Job Sheet 5-4-3, Maintenance of the AN/WSC-6A(V)9.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.5 Maintenance of the HPA and HVPS

CLASS PERIODS: 1
LAB PERIODS: 0
PA PERIODS: 0

Enabling Objectives:

5.13 **TEST** the HPA and HVPS in accordance with applicable technical manuals

5.14 **TROUBLESHOOT** the HPA and HVPS in accordance with applicable technical manuals

5.15 **DESCRIBE** the maintenance requirements for the HPA and HVPS in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the HPA and HVPS, Outline Sheet 5–5–1
   b. Maintenance of the HPA and HVPS, Assignment Sheet 5–5–2
   c. Maintenance of the AN/WSC-6A(V)9, Job Sheet 5–5–3

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.5 Maintenance of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-5-1, Maintenance of the HPA and HVPS.
2. TEST the HPA and HVPS in accordance with applicable technical manuals	2. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Chapter 4.2.5.3 page 4-74 through 4-76 Hardware Profiles-HPA Tab.
a. Loopback Testing	
3. TROUBLESHOOT the HPA and HVPS in accordance with applicable technical manuals	
a. Lights and Text	
b. Verify proper inputs	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
c. Verify proper outputs	
d. Observe Indications	d. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Chapter 5.4.3 page 5-24 through 5-28 HPA Diagnostic Profile.
(1) OIU Indications	
(2) Fault indicator	
(3) RF Inhibit	
(4) Power Supply Voltages	
e. Online Technical Manuals	

Topic 5.5 Maintenance of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
4. DESCRIBE the maintenance requirements for the HPA and HVPS in accordance with applicable technical manuals	
a. Planned Maintenance System	
(1) Clean and Inspect	
b. Replacement of the HPA and HVPS	
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 5-5-2, Maintenance of the HPA and HVPS.

Topic 5.5 Maintenance of the HPA and HVPS

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
8. Job Sheet	8. Direct trainee to perform Job Sheet 5-5-3, Maintenance of the AN/WSC-6A(V)9.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.6 Maintenance of the ACU

CLASS PERIODS: 1
LAB PERIODS: 0
PA PERIODS: 0

Enabling Objectives:

5.16 **TEST** the Antenna Control Unit in accordance with applicable technical manuals

5.17 **TROUBLESHOOT** the Antenna Control Unit in accordance with applicable technical manuals

5.18 **DESCRIBE** the maintenance requirements for the ACU in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the ACU, Outline Sheet 5–6–1
   b. Maintenance of the ACU, Assignment Sheet 5–6–2
   c. Maintenance of the AN/WSC-6A(V)9, Job Sheet 5–6–3

Topic 5.6 Maintenance of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-6-1, Maintenance of the ACU.
2. TEST the ACU in accordance with applicable technical manuals	
a. While energized, the ACU performs a continuous on-line test of all major circuit card assemblies	
(1) From the Operator Interface Unit, Ship Operations Screen, Diagnostic Button under Port or Stbd (dual config) Antenna	
(a) Green - no faulty condition, OK	
(b) Red - faulty condition exist	

Topic 5.6 Maintenance of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
3. TROUBLESHOOT the ACU in accordance with applicable technical manuals	
a. Under the Port/Stbd Antenna tab, within the ACU block, if a RED status indicator is lit - troubleshoot that module.	
(1) Refer to module troubleshooting in system technical manual section 5.4 page 5-9.	
4. DESCRIBE the maintenance requirements for the ACU in accordance with applicable technical manuals	
a. Corrective Maintenance - refer to system technical manual section 5.4 page 5-9	
b. Preventive Maintenance - refer to system technical manual section 5.1, table 5-1, page 5-2.	

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.6 Maintenance of the ACU

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
5. Safety	
6. Review and Summary	
7. Assignment	7. Refer trainee to Assignment Sheet 5-6-2, Maintenance of the ACU.
8. Job Sheet	8. Direct trainee to perform Job Sheet 5-6-3, Maintenance of the AN/WSC-6A(V)9.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.7 Maintenance of the Antenna/Pedestal Group

CLASS PERIODS: 2
LAB PERIODS: 6
PA PERIODS: 0

Enabling Objectives:

5.19 **TEST** the Antenna/Pedestal Group in accordance with applicable technical manuals

5.20 **TROUBLESHOOT** the Antenna/Pedestal Group in accordance with applicable technical manuals

5.21 **DESCRIBE** the maintenance requirements for the Antenna/Pedestal Group in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102
2. WSC-6(v)9, MIP 4417 Series

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the Antenna/Pedestal Group, Outline Sheet 5–7–1
   b. Maintenance of the Antenna/Pedestal Group, Assignment Sheet 5–7–2
   c. Maintenance of the AN/WSC-6A(V)9, Job Sheet 5–7–3

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.7 Maintenance of the Antenna/Pedestal Group

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-7-1, Maintenance of the Antenna/Pedestal Group.
2. TEST the Antenna/Pedestal Group in accordance with applicable technical manuals	2. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Chapter 5.4 figure 5-2 Ships Operations Screen.
a. Observe indications	
3. TROUBLESHOOT the Antenna/Pedestal Group in accordance with applicable technical manuals	
a. Ships Operations Screen	
(1) Summary Status Indicator	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(2) State	
(3) Boundary	
(4) Bcn Level	
(5) Role	
b. Hardware Profiles Window	
(1) Correct Satellite Configuration	
(2) Correct Heading	
(3) Correct Mode	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(4) Boundary Profile	
(5) Boundary Conditions	
(6) Bcn Level	
4. DESCRIBE the maintenance requirements for the Antenna/Pedestal Group in accordance with applicable technical manuals	
a. Corrective Maintenance	a. Refer to and direct trainee to refer to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102, Chapter 5.5 page 5-64 through 5-85.
b. Planned Maintenance System	b. Refer to and direct trainee to refer to WSC-6(v)9, MIP 4417 Series, General Contents S-1.
5. Safety	

Topic 5.7 Maintenance of the Antenna/Pedestal Group

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
6. Review and Summary	
7. Assignment	7. Direct trainee to Assignment Sheet 5-7-2, Maintenance of the Antenna/Pedestal Group.
8. Job Sheet	8. Direct trainee to perform Job Sheet 5-7-3, Maintenance of the AN/WSC-6A(V)9.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.8 Maintenance of the RF equipment as a system

CLASS PERIODS: 1
LAB PERIODS: 7
PA PERIODS: 0

Enabling Objectives:

5.22 **TROUBLESHOOT** RF equipment as a system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. None

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the RF equipment as a system, Outline Sheet 5–8–1

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.8 Maintenance of the RF equipment as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-8-1, Maintenance of the RF equipment as a system.
2. TROUBLESHOOT RF equipment as a system in accordance with applicable technical manuals	
a. Interoperability	a. Refer to the system as a whole and how faults will be indicated when other units are faulty.
3. Safety	
a. Personnel	
(1) Multiple Power Sources	
(2) Moving Antenna	(2) Point out yellow safety chain.

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(3) Emergency Power Off	
(4) Training Time Out	(4) Discuss the importance of the proper use of Training Time Out.
b. Equipment	
(1) ESD	
(2) Antenna Mechanical Stops	
4. Review and Summary	
5. Knowledge Test	5. Administer Knowledge Test 4K.
6. Performance Test	6. Administer Performance Test 4P.

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.9 Troubleshoot the AN/WSC-6A(V)9 as a system

CLASS PERIODS: 1
LAB PERIODS: 8
PA PERIODS: 0

Enabling Objectives:

5.23 **PERFORM** Preventative Maintenance on the AN/WSC-6A(V)9 in accordance with applicable technical manuals

5.24 **TROUBLESHOOT** the AN/WSC-6A(V)9 as a system in accordance with applicable technical manuals

Trainee Preparation Materials:

A. Trainee Support Materials:

1. None

B. Reference Publications:

1. None

Instructor Preparation:

A. Review Assigned Trainee Material

B. Reference Publications:

1. Satellite Communication Set AN/WSC-6A(V)9, 3079068-102

C. Training Materials Required:

1. Instruction Sheets
   a. Maintenance of the AN/WSC-6A(V)9 as a system, Outline Sheet 5–9–1

LESSON PLAN

Unit 5. MAINTENANCE OF THE SHF RF EQUIPMENT **A-101-0145**

Topic 5.9 Troubleshoot the AN/WSC-6A(V)9 as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
1. Introduction	1. Establish Contact. Refer trainee to Outline Sheet 5-9-1, Maintenance of the AN/WSC-6A(V)9 as a system.
2. TROUBLESHOOT the AN/WSC-6A(V)9 as a system in accordance with applicable technical manuals	2. Direct trainee to Satellite Communication Set AN/WSC-6A(V)9, 3079068-102.
3. Safety	
a. Personnel	
(1) Multiple Power Sources	
(2) Moving Antenna	(2) Point out yellow safety chain.
(3) Emergency Power Off	

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
(4) Training Time Out	(4) Discuss the importance of the proper use of Training Time Out.
b. Equipment	
(1) ESD	
(2) Antenna Mechanical Stops	
4. Review and Summary	
5. Assignment	
6. Knowledge Test	6. Administer Knowledge Test 5K.
7. Performance Test	7. Administer Performance Test 5P.

Topic 5.9 Troubleshoot the AN/WSC-6A(V)9 as a system

DISCUSSION POINT	RELATED INSTRUCTOR ACTIVITY
8. PERFORM Preventative Maintenance on the AN/WSC-6A(V)9 in accordance with applicable technical manuals	

ANSWER SHEET

Assignment Sheet 2-1-6

1. What are the 4 principle signals of interest when working with baseband communication.

Ans: TC, TD, RC, RD
Presentation

2. What is the purpose of the FIREBERD 6000?

Ans: Multifunction communications analyzer used for testing, monitoring, & analysis of digital communication circuits.
FIREBERD

3. What is the purpose of the COS(Code Operated Switch)?

Ans: Is a versitile remote control interface for connecting computers and peripherals using the common serial (RS-232) (RJ-45) and parallel (Centronics) interfaces of equipment.
Alternate definition: An interface that allows the operator to monitor, communicate, and control various units of the baseband suite (ex. TIMEPLEX, AN/FCC-100(V)9, Digital modems) via the OIU
COS pg. 2
Presentation

4. How does the OIU communicate with the COS?
Ans: via a computer serial port, and utilizes software such as Procom Plus, or Hyper-terminal.

ANSWER SHEET (CONT.)

Pg. 11 & pg. 13

5. What is the purpose of the SB-4124?
   Ans: Multipurpose, multi-signal patch panel used as a central interface for interconnecting baseband equipment without requiring fabrication of special cables or interfaces.
   Presentation

Assignment Sheet 2-2-2

1. Greater than or equal to the sum of the port data rates and overhead data rates required.
   pg. 4-18

2. 16
   pg. 1-4

3. module type and strapping options
   pg. 2-8

4. Normal Mode & Prompt Mode
   pg. 3-11 & 3-13

5. MODE SELECT
   pg. 3-3

ANSWER SHEET (CONT.)

6. PREV ENTRY & NEXT ENTRY
   pg. 3-3

7. 2
   pg. 3-11

8. Hardware/Software configuration error
   pg. 6-6

9. ACTIVATE
   - A-CONFIG
   - B-CONFIG
   - LOC
   - LOC&REM

   pg. 3-5

10. 39,800 to 50 Kbps

Assignment Sheet 2-3-3

1. 2000
   pg. 1-1 user

2. [NOD XXX] DSP CH {n:ss:cc}
   pg. 3-1 user

ANSWER SHEET (CONT.)

3. 18, 13, 6
   pg 2-1, 3-1, 4-1 I & M manual

4. Display channel parameters
   pg. 5-3 user

5. Disconnect the channel, then re-connect channel

6. 7
   pg. 2-17 config & planning manual

7. dsp st sy
   pg. 5-102 user

8. Interrupts power to the module
   pg. 9-2 I & M

9. 1 x 10 -5
   pg. 5-82 user

10. It transfers data and voice between channels and an intermachine link. The module multiplexes the date and voice, assembles the frame, and maintains intermachine link synchronization.
    pg. 15-1 I & M

ANSWER SHEET (CONT.)

Assignment Sheet 2-4-3

1. Paper tape reader to transfer a crypto variable from paper/milar tape to electronic format.
   Info sheet KG-194A P.1-6

2. 6 memory crypto variable storage/fill device.
   Info sheet KG-194A P.1-6

3. Low Cost Terminal (LCT) is a secure/non-secure telephone that can be located in unclassified areas and is currently being installed ashore and afloat.
   Pg. 54 Blue book

4. They provide encryption/decryption of teletype and data traffic on dedicated links between various types of I/O.
   Pg. 76 Blue book

5. Secure/Non-secure voice, fax, & data terminal. With Secure voice at data rates up to 32 Kbps, synchronous data up to 128 Kbps, & asynchronous 38.4 Kbps
   Info sheet

6. A general purpose trunk and/or bulk encryption and decryption devices for use with tactical, ground mobile and fixed plant applications.
   Pg. 76 blue book

ANSWER SHEET (CONT.)

7. Microprocessor based crypto-variable fill and storage device.
   Info sheet

8. The KY-68 is a digital subscriber terminal for voice/data subscriber terminal circuits. It handles 16 Kbps or 32 Kbps traffic and provides secure and non-secure access to switched networks. It also provides secure access to non-switched networks. Secure/non-secure voice and data communications?
   Info sheet

Assignment Sheet 2-5-2

1. Alarms 1)xmt-off 2)rcv-off
   Faults 1)xmit-off 2)rcv-off 3)common-off 4)stored-off/yellow(history)
   Power On - green ; Xmit On - green ; Carrier Detect - green ; Test mode - off
   Eb/No >6.0 db
   SLM-3650 pg. 3-2

2. ADVANCE switch, SELECT switch
   COS manual pg. 50

3. 16 full duplex circuits
   FCC-100(V)9 pg. 1-4

ANSWER SHEET (CONT.)

4. used to support 2 PCM channels. Designed to compress 64kbps PCM channels to either 4.8 or 16 Kbps
   FCC-100(V)9 pg. 2-22

5. Voice 32 Kbps(secure) ; Data 128 Kbps (synch) ; 38.4 Kbps (Asynch)
   STE pg. 1-4

6. 2.5 Mbps
   SLM 3650 pg. 3-9

Assignment Sheet 3-1-2

1. Green = OK
   Yellow = Warning
   Red = Fault
ref comm. Set Pg. 4-49

2. Indicates if the antenna is currently blocked. Valid rqnge is Blocked and Clear
ref comm. Set Pg. 4-58

3. Standby
   Autotrack-Independent
   LOS (Line of Sight)
ref comm. Set Pg. 4-67

ANSWER SHEET (CONT.)

4. 10deg. to protect personnel from RADHAZ
ref comm. Set Pg. 4-144

5. Demodulator Acquisition Status will only transition from Acquiring to K7 Lock when Viterbi Decoding is active. Status will transition from Acquiting to Carrier Lock in less than 2 minutes when Viterbi Decoding is disabled
ref comm. Set Pg. 4-148

Assignment Sheet 3-2-3

1. 0002
Ref MPA Manual PG A-12

2. 52-88 MHz in 1.0 KHz steps
Ref MPA Manual PG A-17

3. 2048 Kbps.
Ref MPA Manual PG A-29

4. Compensates for the frequency difference between the timing derived from the recovered link data and the fixed timing used to clock the receive data from the modem.
Ref MPA Manual PG A-34

5. Fixed, station derived clock
Ref MPA Manual PG A-33

ANSWER SHEET (CONT.)

Assignment Sheet 3-3-2

1. The hardwired ship's ID in the Control Chassis.
   Pg 3-11

2. 1x10EE-11
   Pg 3-11

3. J13
   Pg 3-11

Assignment Sheet 3-4-2

1. The RF/IF Assembly receives RF input from the antennas and is routed to the Port/Starboard Block Downconverters. The BDC's downconvert the RF to L-Band and output to the FTDC's via 10dB couplers. The FTDC's are tuned to the beacon frequencies, and downconvert the L-Band signals to IF and route to the ACU for satellite tracking.

2. Non-Inverting translation PG 3-15.

3. 630 MHz PG 3-15

4. 1500-2000 MHz PG 3-17

5. 1500-2000 MHz PG 3-29

6. -15 - -55 dBm PG 3-30

ANSWER SHEET (CONT.)

Assignment Sheet 3-5-2

1. ACU mute signal conditions:
   a. Either of the boundary signals for the antenna selected for communications indicates a blocked condition.
   b. Tracking signal for the selected antenna is below threshold.
   c. The SERVO ON key switch for the selected antenna is switched off.
   d. During antenna initialization.
   e. While the transmit waveguide switch is changing over.
   f. While the Transmit TEST MUTE switch on the AHM front panel is operated.
   g. If the transmit waveguide switch appears to be connected to neither or both antennas.
   h. Radome door interlock for the active antenna is opened.
   i. ACU is turned off.

2. X-Band = 1000 Watts C-Band = 800 Watts Ref: Comm Set manual Pg. 1-39

Job Sheet 3-5-3

The HPA requires and input to produce an output. The input in this case comes from the RF/IF Assembly which must have an input to produce an output. The input to the RF/IF Assembly comes from the modem which must have an input to produce an output.

ANSWER SHEET (CONT.)

Assignment Sheet 3-6-3

1.
Module - Function
Antenna Processor Module - Communicates with the OIU to support control and status data transfer.

Analog Interface Module - Interfaces the APM's digital data and the analog control and feedback signals within the ACU; Interfacing, conditioning and A/D conversion of elevation, cross-elevation, polar rate, gyro, accelerometer and beacon detect signals; D/A Conversion of the data from the APM for dynamic antenna axis control.

Wooded Arc Module - Generates blocked signals for personnel and equipment safety.

Antenna Handover Module - Uses boundary signal states to generate HPA mute; Generates drive signals for the antenna handover switches.

Dual Beacon Detect Module - Converts the 70MHz IF from the FTDC's to an analog signal level which is sent to the Antenna Interface Module for positioning and tracking the satellite.

Elevation Servo Amplifier Module - Generates the control current to drive the elevation drive motor.

Cross-Level Servo Amplifier Module - Generates the control current to drive the cross-level drive motor.

ANSWER SHEET (CONT.)

Training Servo Amplifier Module - Generates the control current to drive the azimuth drive motor.

400Hz Reference Generator - Generates 26V, 400Hz reference signal required by the antenna resolvers and the resolver to digital converters in the WAM.

Power Supply Unit +5/+/-15/+24VDC - Supplies operating power for the ACU modules and provides the 24 VDC to the antenna for the accelerometer, gyro and LNA's.

Power Supply Unit +48VDC - Used by the SAM modules to generate the motor drive current for the AZ, EL and X-Level drive motors.

Assignment Sheet 3-7-2

1. c

2. True

3. True

Assignment Sheet 4-1-2

1. 6

2. !@#$C

ANSWER SHEET (CONT.)

3. 2 HOURS

4. 40298

5. 7, 2047

Assignment Sheet 4-2-2

1. 2 interface submodules, 2 terminator submodules, and proper jumper settings
   pg. 2-8

2. Port transit data/clock faster or slower than configuration
   pg. 6-6

3. MIL-188-114 Navy Standard
   pg. 2-30

4. From RESTART press "Next Entry" until "Loopback" is displayed, mode select, press "Next Entry" until aggregate LB is displayed. Press "store", "down arrow", "store"
   pg. 6-9

5. 50 bps - 768Kbps
   pg. 1-9

6. LED 3

ANSWER SHEET (CONT.)

pg. 6-16

7. From RESTART Press "Next Entry" until "Testing" is displayed, "Mode Select", "yes", "Store", "down arrow", "store"
pg. 4-48

Assignment Sheet 4-3-2

1. ILC DIP switch N19-1
I & M manual pg. 15-3

2. Dip switch K1-7 settings for the online NCL supervisory port are incorrect or OIU parameters for the Meta TAB "TPLX" are incorrect.
I & M manual pg. 23-5

3. Either Timeplex on the side experiencing the ROS is not transmitting usable information, or the timeplex on the other end is not receiving usable information. Lights when remote Interlink Module receive data is out-of-sync with local Interlink Module transmit data.
I & M pg. 15-2

4. Lights if a local hardware or firmware failure occurs, or if Nework Module receives an alarm form a remote node.
I & M 23-4

5. -48 VDC power supply

ANSWER SHEET (CONT.)

I & M MANUAL, P.36-3

6. CON DR command
TIMEPLAX USER'S MANUAL P. 6-49

Assignment Sheet 4-5-3

1. TP1 (odd) TP7 (even), for TXD in, TP2(odd) TP8(even) for RXD, TP3(odd) TP9(even) TT, TP4 (odd) TP10(even) RXC in. TP4 (odd) TP10(even).
FCC-100 pg. 6-17

2. QSP IRP switch in the IRP position, QSP card not in the slot, QSP car malfunctioning
User manual pg. 6-96 & 5-96

3. Bandwidth fully used; No complete route to destination node; Number of bypasses to destination node exceeds ch delay threshold parameter; A chnnel has a bias route programmed, but the ch delay threshold parameter is not large enough to use the bias route; Inoperative bypass module at intermediate bypass mode; all of the bypass channels at one or more bypass nodes are already in use; bypass connect queue at intermediate bypass node is full; specified phasor size too low to be accommodated by intermachine link frame; X.50 DS-0 channel is out-of-service.
User manual pg. A-5

4. Ans: Major
SLM pg. 5-13

ANSWER SHEET (CONT.)

5. By looping back the distant end TIMEPLEX channel and patching the BERT into the ship channel and monitor Bit errors and pattern slips.

Assignment Sheet 5-1-2

1. 2A6
2. 2A11 (Ethernet hub) and 2A12 (Ethernet transceiver)
3. Remote OIU
4. Operations, Hardware profiles, Diagnostic profiles

Assignment Sheet 5-2-2

1. 2A5
2. 2A5A0
3. 2
4. OIU
5. J8
6. False

ANSWER SHEET (CONT.)

Assignment Sheet 5-3-2

1. Unit 4
2. J1
   (page 3-48)
3. 440 - 208
4. Frequency
5. 1250 Mhz

Assignment Sheet 5-4-2

1. 2A4A9
2. 13
3. 1350 - 1925 Mhz
4. 1500 - 2000 Mhz
5. 4500 Mhz
6. 6400 Mhz

ANSWER SHEET (CONT.)

7. Translates receive signal for proper frequency when doing RF loopbacks

Assignment Sheet 5-5-2

1. They will have the same serial number

2. 15,000

3. 0dB

4. One for each band

5. 2A10

Assignment Sheet 5-6-2

1.

Assignment Sheet 5-7-2

1. Otrho mode Transducer - Prevents the transmit signal from interfering with the receive signal due to using the same antenna for both transmit and receive.

2. Elevation Servo Amplifier Module - 2A7A11

3. 48V Power Supply

ANSWER SHEET (CONT.)